EXECUTIVE CHAMBERS

HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

April 5, 1983

Mr. Roy R. Takemoto, Chairman
Environmental Quality Commission
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Takemoto:

Based on the recommendation of the Office of Environmental Quality Control, I am pleased to accept the environmental impact statement for the Lahaina Wastewater Treatment Plant Expansion as a satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in deciding whether this project should be allowed to proceed. My acceptance of the statement is an affirmation of its adequacy under applicable laws and does not constitute an endorsement of the proposal.

When the decision is made regarding this action, I expect the proposing agency to carefully weigh the societal benefits against the environmental impact which will likely occur. This impact is adequately described in the statement, and, together with the comments made by reviewers, provide a useful analysis of alternatives to the proposed action.

With warm personal regards, I remain,

Yours very truly,

George R. Ariyoshi

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET, 4th FLOOR
HONOLULU, HAWAII 96813

Lahaina Wastewater
Treatment Plant Expansion

FINAL ENVIRONMENTAL IMPACT STATEMENT

COUNTY OF MAUI

March 1983

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CONTENTS (Continued)

CONTENTS (Continued)

TABLES

SUMMARY

A. PROPOSED ACTION

The County of Maui seeks to construct an expansion to their existing wastewater treatment facility at Honokowai. The proposed facility will be constructed by Amfac Property Corporation. It will be operated and ultimately owned by the County of Maui Department of Public Works. It will treat wastewater generated by the West Maui communities and the Kaanapali Beach Resort. The expansion will have a treatment capacity of 3.5 million gallons per day and will provide full secondary wastewater treatment. Construction is scheduled to start in June 1983, and operation should begin in late 1984 or early 1985.

B. DESCRIPTION OF PROJECT AREA AND ENVIRONMENTAL SETTING

The proposed 8-acre site is adjacent to the existing County wastewater facility at Honokowai. The site is currently leased by Pioneer Mill Company (PMCo.) for cane production. The site is bordered by a car rental/transportation center to the south; a cane haul road and cane fields to the east; the Honoapiilani Highway to the west; and the existing County treatment facility to the north.

The project site is generally underlain by gravel alluvium deposited by Honokowai Stream. The site is located approximately 1,000 feet from Honokowai Stream. Ecosystems that once occurred naturally have long since been eliminated from the site by cane production. Air quality and ambient noise levels at the site are generally good.

The proposed Lahaina Community Plan calls for continued resort and municipal development in the areas to be served by the proposed facility. This community plan supports continued growth in the services and retail trade industries which are currently the primary economic activities in the Lahaina District.

C. RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS

The proposed facility expansion site lies within the agricultural land use district. Wastewater treatment is not a permitted use in this district. Consequently, a special use permit has been approved by the County of Maui Planning Commission. The proposed Lahaina Community Plan designates the site for public/quasi-public uses, which include wastewater treatment facilities. The proposed plan is expected to be enacted long before completion of the proposed facility expansion; therefore, the expansion will conform to the general plan designation.

D. PROBABLE ENVIRONMENTAL IMPACTS

Constructing the proposed facility expansion will remove approximately 8 acres of cane land from cultivation. A secondary impact could be the further reduction of 65 acres by 1990 if Amfac decides to use its remaining treatment capacity to support resort expansion. The PMCo. staff has indicated that these acreage reductions will not significantly or negatively impact plantation productivity and profitability at least through 1993. These acreage reductions are consistent with the proposed Lahaina Community Plan.

Important regionwide benefits will result from the facility expansion. It will:

- Accommodate future community growth as designated in the proposed Lahaina Community Plan.
- Provide both permanent and temporary allocations of needed treatment capacity to the adjacent County facility.
- Enable the County to hook up the Napili-Honokowai wastewater line on schedule.
- Protect public health and water resources by ensuring state-of-the-art treatment of resort and municipal wastewater.
- Ensure that the disposal of wastewater remains in compliance with state and Federal public health and wastewater quality regulations.

The proposed facility will accommodate a portion of the future growth outlined in the proposed Lahaina Community Plan. Therefore, a secondary impact of the proposed action will be increased growth and development in the Lahaina District.

E. UNAVOIDABLE ADVERSE IMPACTS

The proposed facility's most significant long-term impact is its accommodation of further development in the Lahaina District. Selected agricultural lands would be converted to urban uses.

During construction, both dust and noise levels will increase. These short-term impacts can be mitigated.

F. ALTERNATIVES TO THE PROPOSED ACTION

Four alternatives to the proposed action were considered:

- Expand existing County facility.

- Construct a private facility for Kaanapali wastewater.
- Increase capacity of proposed facility expansion.
- No action or postponing action.

G. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Both short-term and long-term environmental gains include eliminating potential hazard to the public's health, safety, and welfare; eliminating any likelihood of groundwater contamination from inadequate wastewater treatment; and providing a significant volume of high quality nonpotable water usable for irrigation purposes. These gains outweigh the short-term losses of disrupted local conditions resulting from construction activities and the long-term effects of planned municipal and resort growth.

H. MITIGATING MEASURES

The widespread substitution of drip for furrow irrigation systems throughout the PMCo. plantation can be regarded as a mitigation measure to offset expected income losses from decreases in cultivated acreage.

Dust, erosion, and noise impacts typically caused during construction can be mitigated through construction controls.

I. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Development of the facility expansion precludes any other use of the intended site during its 20-year design life. The 8-acre site will be permanently lost to sugarcane production. The materials and energy that this project requires cannot be recovered.

J. OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENT POLICY THAT OFFSET ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The proposed facility expansion will ensure that all wastewater originating from both the West Maui communities and the Kaanapali Beach Resort receives the highest possible level of treatment. Existing water quality hazards in the Napili-Honokowai area will be resolved, and future development can occur while maintaining a high level of regional water quality.

K. ORGANIZATIONS AND PERSONS CONSULTED

A list of organizations and persons consulted is included in Section XI of the Environmental Impact Statement.

L. LIST OF NECESSARY APPROVALS

The County of Maui Planning Commission has issued a special use permit for the proposed project. Remaining necessary approvals include legislative approval of setting aside the facility expansion site for County use and issuance of construction approval by the Hawaii Department of Health.

Section I
PROPOSED ACTION

A. WEST MAUI WASTEWATER TREATMENT NEEDS

1. Goals and Objectives

The Lahaina Judicial District is located on the western slopes and coastal plain of West Maui, as shown on Figure 1. Urban settlements and tourist destination areas are concentrated in a narrow band along the shoreline between the communities of Lahaina and Kapalua. The developed areas are set against a higher elevation backdrop of rolling sugarcane and pineapple fields and the West Maui Mountains.

Population and urbanized areas in Lahaina District have grown rapidly over the last 20 years, primarily in response to development of an extensive and profitable visitor industry. Lahaina District faces the dual challenge of providing adequate housing, infrastructure, human services, and economic opportunities while maintaining the agricultural industries and small town settings that have historically characterized this region. The responsibility to satisfy these contrasting needs lies with the County of Maui in concert with the West Maui community. Decisions will be directed by the region's land use and development plans. Continued growth is projected in both residential and resort uses.

It is the County of Maui's objective to ensure that wastewater generated by current uses and future development is thoroughly treated according to the standards of the State Department of Health (DOH). Amfac Property Corporation (Amfac), a major landowner and developer, also needs adequate wastewater treatment capacity for both existing uses and continued development of the Kaanapali Beach Resort. Additional resort and residential uses are consistent with both the Lahaina General Plan and the proposed Lahaina Community Plan.

The County of Maui and Amfac propose to construct a new wastewater treatment facility as an expansion to the existing County treatment facility in Honokowai. The expansion will occur on an 8-acre site adjoining the County treatment facility immediately mauka of Honoapiilani Highway at the turnoff to Honokowai. The proposed facility expansion will be funded and built by Amfac. It will be operated, and ultimately owned, by the County Department of Public Works.

The proposed facility expansion is needed by the residents of West Maui, the County of Maui Department of Public Works, and Amfac. The existing County wastewater treatment facility's capacity of 3.2 million gallons per day (mgd) is

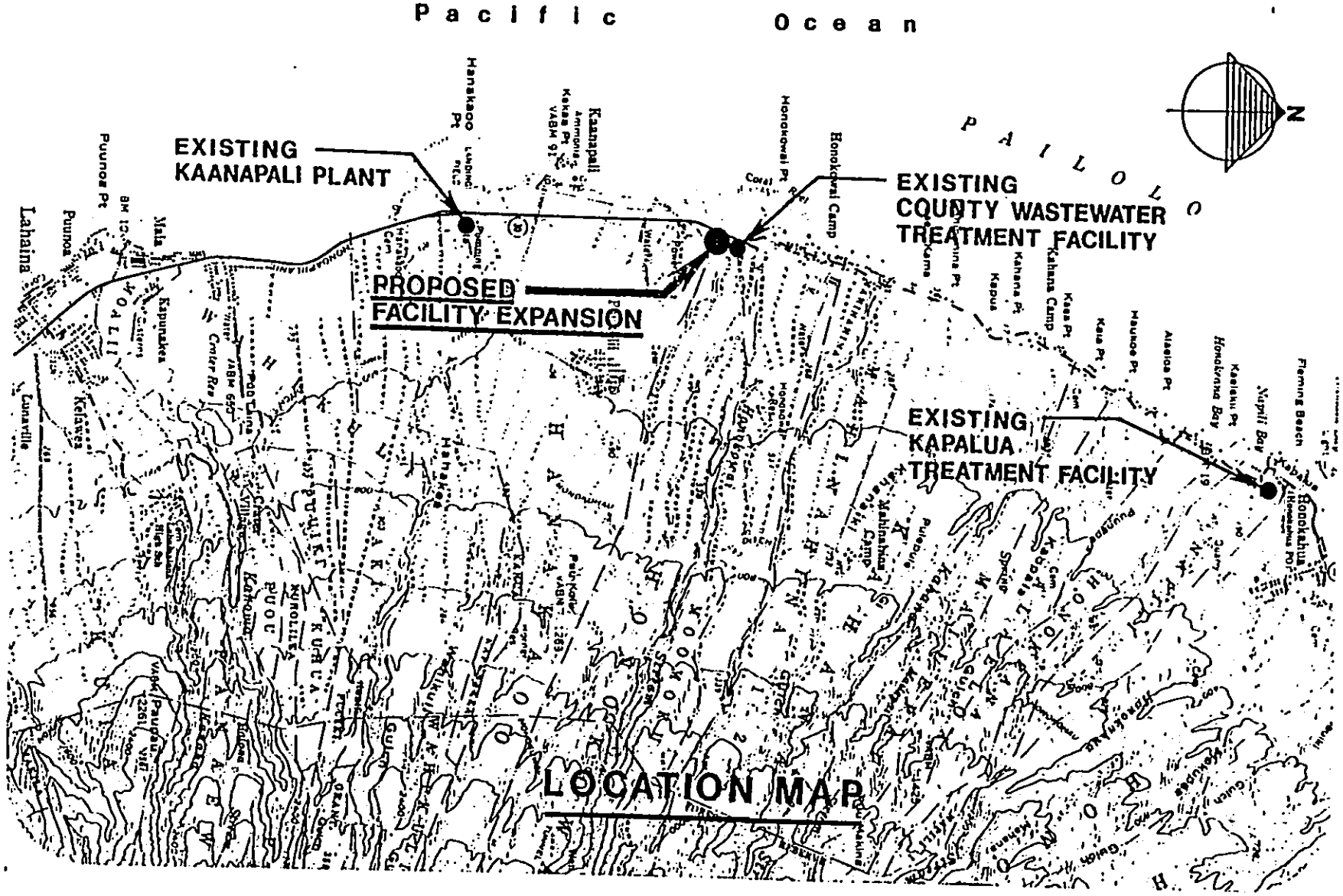
Pacific Ocean
PAILOLO
N
EXISTING KAANAPALI PLANT
PROPOSED FACILITY EXPANSION
EXISTING COUNTY WASTEWATER TREATMENT FACILITY
EXISTING KAPALUA TREATMENT FACILITY
LOCATION MAP
Lahaina
Puunoa
Puunoa Pt
Mala
Kapunakea
Kelawea
Lunaville
Crater Village
Center Res
Hanakaoo Pt
Kaanapali
Kekaa Pt
Hahakea
Honokowai Pt
Honokowai Camp
Honokowai
Mahinahina Camp
Kahana Pt
Kahana Camp
Kaa Pt
Haukoe Pt
Alaeloa Pt
Honokeana Bay
Kaeleku Pt
Napili Bay
Fleming Beach
Honokahua
Kaopala Spring
Puu Kolii
Paupau

FIGURE 1

not sufficient to serve projected future populations. The proposed project, designated as Phase II of the County treatment facility, is actually the first of the possible expansion phases of the existing facility. Without this proposed expansion, future community and resort growth in West Maui would be inhibited. Hookup of the new Napili-Honokowai collection system is also dependent upon construction of the proposed facility.

2. Wastewater Treatment Strategy

The proposed facility expansion will have an average treatment capacity of 3.5 mgd and can treat peak hour wet weather flows up to 7.5 mgd.[1] Facility construction will be completed in late 1984-early 1985, and will increase West Maui's total available treatment capacity from 3.2 mgd to 6.7 mgd. The Sewer Treatment Facilities Dedication Agreement executed in October 1982 between the County of Maui and Amfac reserves a total of 3.16 mgd of the 3.5-mgd expansion capacity for Kaanapali resort users in perpetuity (Figure 2). Should resort wastewater demand exceed 3.16 mgd, Amfac must increase the available treatment capacity by either building or funding the necessary facility expansion. (Appendix A describes the methods used to project wastewater demand in West Maui.)

When the expansion is completed, Amfac will dedicate ownership of 0.34 mgd of the capacity to the County together with the capacity needed to serve the projected flows from existing resort land uses. These existing land uses should generate approximately 2.0 mgd when the plant is started up. Ownership of Amfac's remaining 1.16-mgd capacity will be incrementally dedicated to the County as necessary to support future resort growth consistent with the Lahaina General Plan and the proposed Lahaina Community Plan. Until, and if, such incremental dedications become necessary, the County will have temporary use of the remaining 1.16-mgd capacity to support municipal growth. The County will also regain the 0.66 mgd of capacity currently reserved to Amfac in the existing County treatment facility. Available municipal treatment capacity upon completion of the proposed expansion will be the existing 3.2 mgd plus the 0.34 mgd dedicated portion, for a total of 3.54 mgd.

Most municipal and resort wastewater is generated by domestic uses. Only a small portion comes from commercial sources such as retail shops and restaurants. Heavy metals or industrial wastes are neither treated nor expected to be treated.

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[1] Peak hour flows are calculated for wastewater generated during the rainy winter seasons, since infiltration or seepage by groundwater into the wastewater collection lines is highest during these periods.

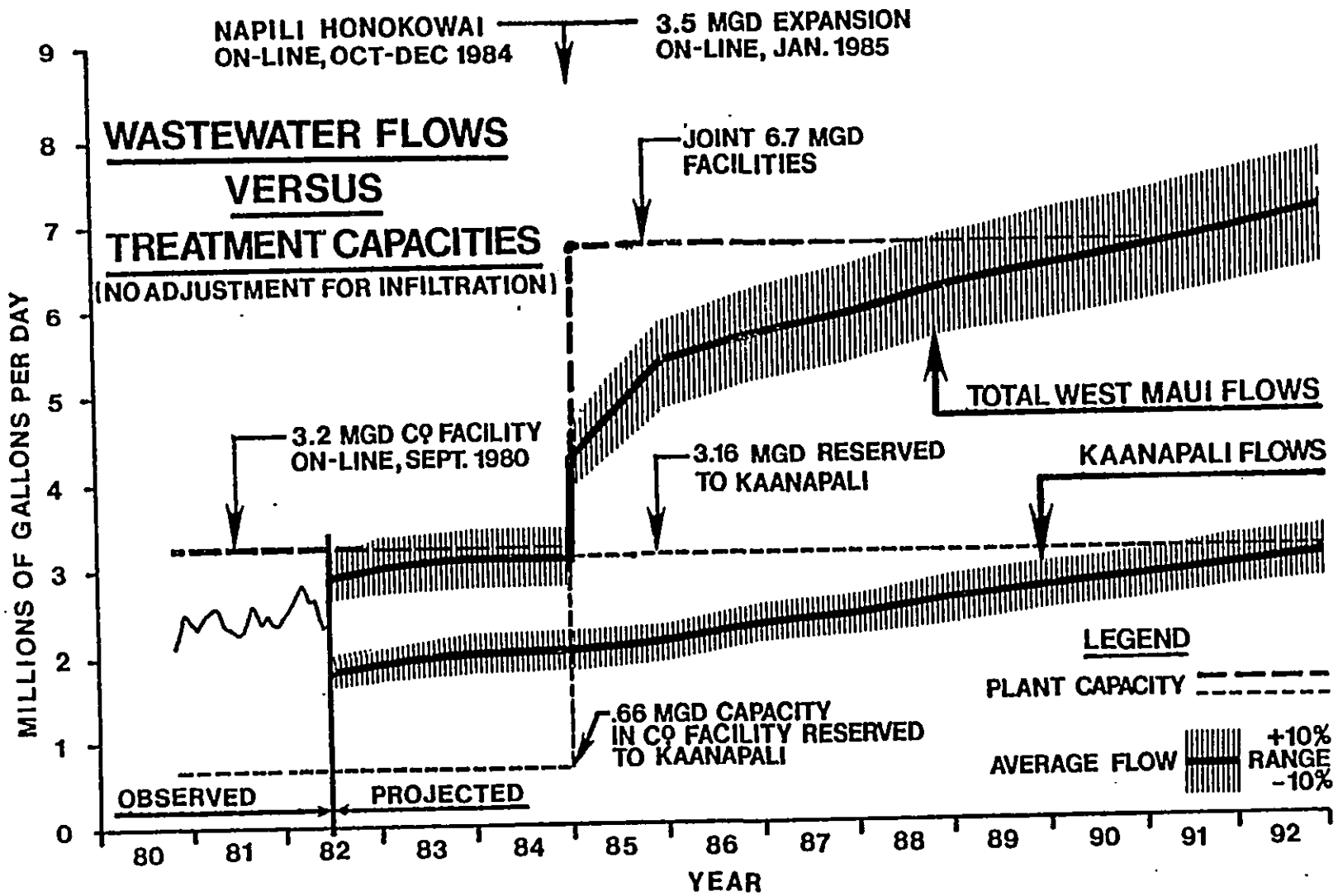

NAPILI HONOKOWAI
ON-LINE, OCT-DEC 1984
3.5 MGD EXPANSION
ON-LINE, JAN. 1985
WASTEWATER FLOWS
VERSUS
TREATMENT CAPACITIES
(NO ADJUSTMENT FOR INFILTRATION)
JOINT 6.7 MGD
FACILITIES
TOTAL WEST MAUI FLOWS
3.2 MGD C9 FACILITY
ON-LINE, SEPT. 1980
3.16 MGD RESERVED
TO KAANAPALI
KAANAPALI FLOWS
MILLIONS OF GALLONS PER DAY
9
8
7
6
5
4
3
2
1
0
.66 MGD CAPACITY
IN C9 FACILITY RESERVED
TO KAANAPALI
LEGEND
PLANT CAPACITY
AVERAGE FLOW
+10%
RANGE
-10%
OBSERVED
PROJECTED
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR

FIGURE 2

The proposed facility expansion will produce an effluent with maximum monthly averages of 20 milligrams per liter (mg/l) BOD_5, 20 mg/l suspended solids, and 23/100 milliliters total coliform organisms. These results ensure compliance with state and Federal wastewater effluent quality requirements. In fact, the BOD_5 and suspended solids results will improve on those mandated by the DOH Chapter 38 regulations, which require that the monthly averages of both BOD_5 and suspended solids not exceed 30 mg/l. The resulting effluent will be significantly higher in quality than required by the DOH, in terms of lower bacterial, BOD_5, and suspended solids counts.

The high effluent quality achieved by the expanded facility will provide a safety margin to ensure continuous compliance with the DOH's public health requirements. The proposed effluent standards could also allow for recycling of effluent as irrigation water for Pioneer Mill Company (PMCo.) cane fields.

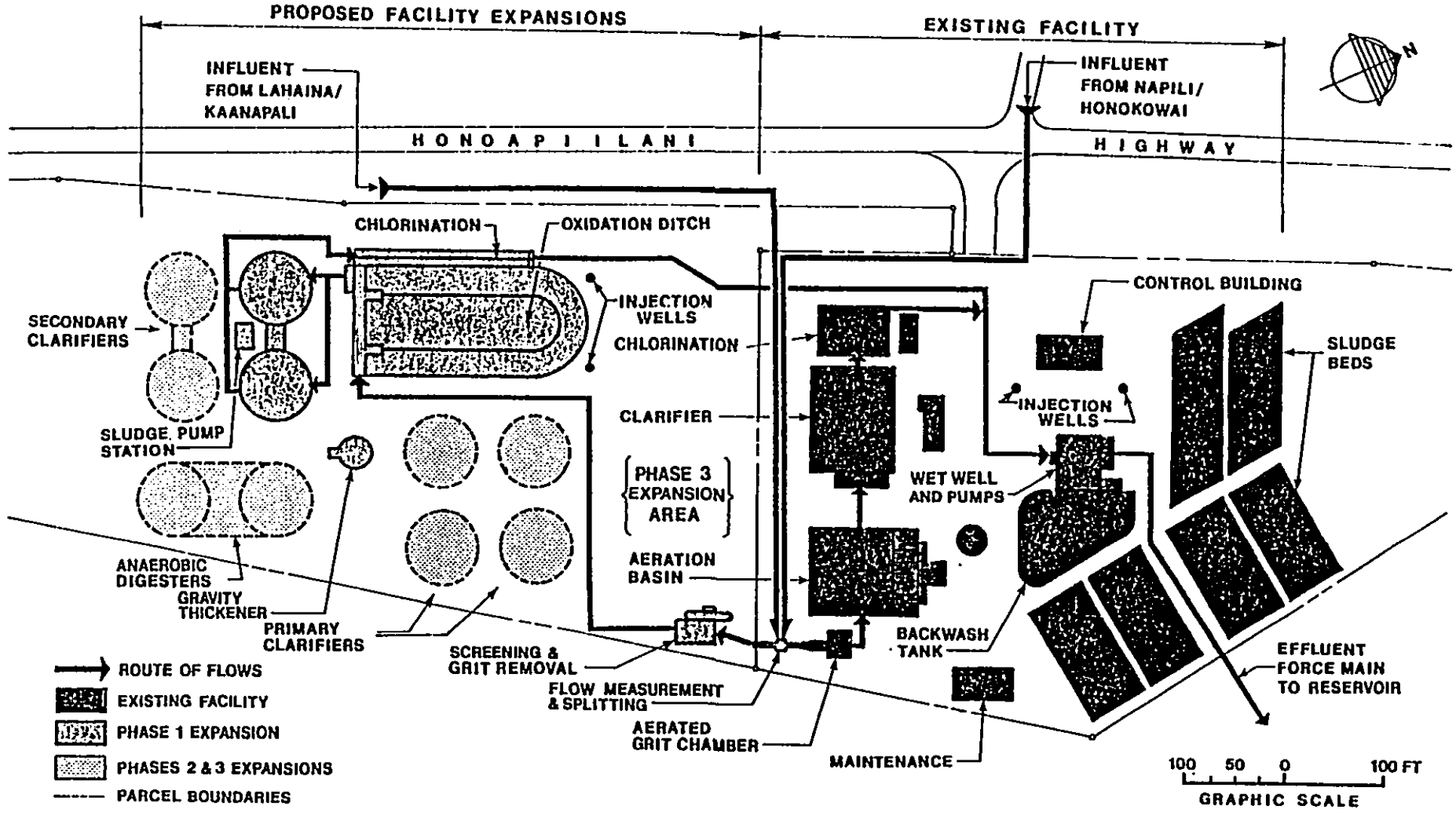
By providing this facility expansion to treat both municipal and resort wastewater, the County of Maui will comply with and further the purposes of both the Lahaina District and County of Maui General Plans, the County of Maui 208 Water Quality Management Plan, DOH Public Health Regulations Chapter 38, and the Federal Clean Water Act of 1977, as amended. No public funds will be expended for the construction of the facility expansion.

B. PROPOSED TREATMENT FACILITY

1. Treatment Description

The proposed facility expansion will provide complete treatment of wastewater by the extended aeration activated sludge process. This process entails digestion, or breakdown, of organic wastes by cultured populations of harmless microorganisms in the presence of artificially supplied oxygen. The microorganisms digest the wastes and render them into predominantly inert particles. Some of these particles dissolve while others remain suspended in solution. The dissolved particles leave the treatment facility entrained in the stabilized effluent, while the suspended particles are concentrated into a slurry that is withdrawn from the system. Figure 3 illustrates the treatment system layout.

Municipal wastewater from Lahaina is pumped to County Pump Station No. 2 adjacent to Kaanapali's inactive wastewater treatment plant. Kaanapali wastewater is combined with the Lahaina wastewater and pumped via force main to the existing municipal treatment facility and its proposed expansion. A shared flow splitter device will divide this influent (raw wastewater) and that coming from Napili-Honokowai between



SITE LAYOUT ~ JOINT WASTEWATER TREATMENT FACILITIES

FIGURE 3

the two treatment facilities, in proportion to each facility's size.

The influent will undergo fine screening to remove large inorganic materials, such as plastics or rags, and to reduce the size of organic solids. The inorganic materials and residual solids greater than 1/4-inch size will be removed to the County sanitary landfill. The influent will then flow by gravity through the grit removal system. Separated grit will be rinsed and removed to the County landfill.

Following grit removal, influent will flow into a special aeration basin called a "Carrousel" oxidation ditch for treatment. This treatment method was chosen over more conventional activated sludge processes because it is energy efficient and produces an effluent of consistently high quality.

After circulating in the oxidation ditch for approximately 17 hours, the treated wastewater flows by gravity to either of two secondary clarifier units. These are essentially settling basins where the sludge separates from the effluent and sinks to the bottom.

Clarified effluent flows by gravity to the chlorine contact chamber for disinfection. The disinfection process eliminates pathogens from the effluent. After the chlorine solution is mixed with the effluent and held in the basin for about one hour, it flows to injection wells and/or a shared wet well and pump station at the existing County treatment facility if it is to be recycled for sugarcane irrigation. A portion of the effluent could be pumped uphill to the County reservoir along with the existing facility's effluent. It could then be released from the reservoir into PMCo.'s ditch system. The majority of the effluent will be disposed of either in two injection wells to be constructed on the proposed expansion site or in two existing injection wells at the County treatment site. Effluent reuse/disposal options are further discussed in subsection 3, below.

Facility construction is scheduled to begin in June 1983, with startup scheduled between late 1984 and early 1985.

2. Land Ownership

The proposed facility expansion site is on land owned by the State of Hawaii and leased to PMCo. It is legally identified as Parcel 2 of the consolidation and resubdivision of Tax Map Keys 4-4-01:104 and 4-4-02:3 and 29 at Honokowai, Kaanapali, Lahaina, Maui, being a portion of government (Crown) land of Honokowai and Royal Patent 7661, Land Commission Award 76, Apana 2 to William Shaw. While the facility expansion will occupy only about half of the approximately 8-acre

site, the entire 8 acres will be removed from cane production as a drainage control measure and to allow for further expansion, if warranted by future community and resort growth.

Since the facility expansion will be dedicated to the County of Maui, the County Department of Public Works received agreement from the State Board of Land and Natural Resources to set aside the site for County wastewater use. A right-of-entry has been granted to the County. The Governor has signed an executive order authorizing the set-aside. Once the state legislature approves the executive order in its 1983 session, the County will have administrative control over the site and can grant Amfac a right-of-entry for construction purposes.

3. Effluent and Sludge Reuse Systems

The byproducts of the wastewater treatment process are effluent and liquid sludge. The current County treatment facility disposes of some effluent through irrigation reuse by PMCo. and the remainder through two existing injection wells. Sludge is currently disposed of in liquid form at the County sanitary landfill. It was formerly disposed at the landfill in dry form after being dewatered on sand drying beds at the treatment facility. The existing drying beds did not always operate as designed and thus created odor and fly problems. Due to these continuing problems, the County has temporarily abandoned use of the drying beds. Alternative reuse and/or disposal methods were evaluated.

Effluent can either be disposed of in newly drilled injection wells or reused to irrigate PMCO.'s cane fields. If effluent reuse were the chosen alternative, the effluent would be pumped uphill to the County reservoir. This 6.5-million-gallon reservoir is located approximately 11,000 feet from the County treatment facility at elevation 740 feet above mean sea level. Effluent pumped into the reservoir would mix with irrigation water delivered from coastal wells and through the Honolua Ditch. Reservoir outlets would release the mixed effluent into PMCo.'s irrigation ditch system. This mixing of ditch water with effluent would dilute the effluent's residual nitrogen concentration to levels compatible with sugarcane production. It also would reduce the high salinity of ditch water originating from some of the plantation's coastal wells.

The major constraint on effluent reuse for irrigation purposes is the high energy costs for pumping the effluent to the reservoir. It appears that the cost of pumping effluent to the reservoir is higher than the purchase price of equivalent water from other available sources. Thus, effluent reuse for irrigation of cane fields does not presently seem to be an economically viable option for PMCo. As the cost

of water from other sources rises in the future, the economic balance may change. The potential for effluent reuse will continue to be monitored.

Alternatives for sludge reuse and/or disposal are varied and include:

- Landfill disposal following a mechanical sludge dewatering process
- Reuse as a fertilizer/soil conditioner through direct land application to cane fields as dewatered or liquid sludge
- Reuse as irrigation water when mixed with the current PMCo. hydroseparator mill process water effluent
- Reuse as topsoil when mixed with the current silt underflow from the PMCo. hydroseparator

All of these alternatives were evaluated and summarized in a report entitled "Technical Memorandum on the Recommended Sludge Management Program for the Lahaina WWTP Expansion" dated February 2, 1983.

The land application methods required the least capital cost. However, higher operational costs and implementation problems with PMCo. requirements for cane prohibited their use. The selected process is mechanical dewatering using belt filter presses followed by landfilling of the solids.

4. Support Systems

Wastewater quality and flow measuring devices will be installed at both the flow splitter unit and at the point where effluent leaves the chlorination chambers. These devices will enable the facility expansion operators to sample both influent and effluent for BOD_5, suspended solids, and coliform, and to measure flow volumes. Sampling will be performed according to DOH standards. Sampling procedures will be specified in the operations and maintenance manual.

To avoid the odor problems previously associated with the adjacent County treatment facility, four treatment units that may produce noxious odors will be covered with aluminum plates. (These four units include the flow splitter unit, flow measurement device, influent screens, and grit removal basin.) Internal air will be removed by exhaust fans and piped to an air scrubbing system in the influent screening building. After being cleansed of odor-causing compounds, the air will be released to the atmosphere.

Emergency standby power will be provided to operate the screening equipment, one aerator, all clarifiers, and all pumps in the chlorination chambers. In emergency situations flow will go by gravity to the injection wells; however, under emergency power the effluent pumps can also pump the chlorinated wastewater to the injection wells located at the County site. This injection well system will provide the required emergency disposal system for the entire facility should the need arise.

The existing County operations and control building is large enough to house the proposed facility expansion control panels and auxiliary facilities with minimal interior modifications. Therefore, a duplicate building need not be constructed at the expansion site.

Fire protection water will be provided by a lateral from the County water line. This lateral will supply water to hydrants in the locations and at the flow rates required by local fire codes.

5. Compatibility with County Treatment Facility

The proposed facility expansion fits within the available site next to the County facility. It is hydraulically compatible with the existing treatment system. Furthermore, the shared features (i.e., chlorination building, instrumentation/control systems, control building, flow splitter, effluent pump station, etc.) are easily integrated into the proposed facility expansion, and no duplication is necessary.

The facility expansion treatment process is similar to that currently in use at the County facility. The proposed extended aeration system will require considerably less operation and maintenance attention than the County system. Should the proposed facility expansion require future enlargement, the larger treatment volume would mandate modification of the "Carrousel" oxidation ditch process to a conventional activated sludge process, which is also compatible with the County treatment facility.

Since the County may eventually need to expand this joint 6.7-mgd treatment system, this proposed expansion was designed to mesh with a modular County facility expansion. The ability to add primary treatment to the proposed expansion and to modify the oxidation ditch will aid in the future compatibility of the two facilities.

The proposed facility expansion is considerably more energy efficient than the County treatment facility. When dedicated, the expansion will not increase the County facility's energy costs by more than 50 to 75 percent, although it will double treatment capabilities.

6. Preliminary Cost Estimates

The proposed wastewater treatment facility expansion will cost approximately $8.81 million (December 1982 cost estimate) to design and construct. Allowing for inflation to escalate construction costs approximately 8 percent by mid-1983 (start of construction), the facility should cost about $9.16 million. Included in this estimate are the costs of site preparation; modifications to certain treatment units and control systems at the existing treatment facility; landscaping for both facilities; as well as design fees, a contingency allowance, and state excise tax.

C. CAPACITY ALLOCATIONS AND FUTURE USE OF TREATMENT FACILITY

When the wastewater treatment facility expansion comes online in late 1984-early 1985, available treatment capacity will increase to 6.7 mgd. The County will have 3.54 mgd to allocate for municipal use (up from the presently available 2.54 mgd), while Amfac will have 3.16 mgd to accommodate Kaanapali wastewater.

By the end of 1984, municipal wastewater treatment obligations will total approximately 3.17 mgd (see Appendix A for methodology and detailed projection of wastewater demand in West Maui). This will leave approximately 0.37 mgd of existing capacity to accommodate further growth. Of the 3.17-mgd demand, about 1.88 mgd will result from existing and committed uses in the Napili-Honokowai collection area; 0.084 mgd from the Kelawea Mauka residential project mauka of Lahaina town; 0.055 mgd from the Kaanapali Hillsides residential project mauka of the Kaanapali Beach Resort; 0.053 from hookup of 150 more existing homes in the Lahaina town and/or Wahikuli areas; and 1.1 mgd generated from existing 1982 Lahaina town residential and commercial uses.

When wastewater treatment facility expansion operations begin, Kaanapali wastewater demand will be approximately 2.0 mgd, leaving 1.1 to 1.2 mgd of capacity to accommodate future resort growth. Commitments have not yet been made for further resort development past the 2.0-mgd treatment demand level, although Amfac is considering development alternatives for its urban North Beach lands. If development results in an average annual wastewater demand increase of 0.12 mgd (a reasonable rate based on past resort growth patterns), Kaanapali's 3.16 mgd of treatment capacity should last through 1991.

Amfac has offered the County temporary use of the resort's reserve capacity (1.1 to 1.2 mgd) until it is needed to accommodate further growth in Kaanapali.

An additional facility expansion, Phase III, is now tentatively sized at 3.5 mgd. The need for Phase III is presently being assessed by the County in light of area growth trends and development patterns suggested in the proposed Lahaina Community Plan. It is expected that Phase III would accommodate further residential, commercial, and condominium/hotel growth throughout the system's entire service area. No tentative date has been set for the initiation of Phase III activities.

D. WEST MAUI WASTEWATER TREATMENT HISTORY

1. Municipal Wastewater Treatment

Prior to construction of the existing wastewater treatment facility, raw wastewater from Lahaina town was discharged offshore of Mala Wharf through a 1,500-foot ocean outfall. In the early 1970's, the County of Maui constructed a 3.2-mgd wastewater treatment facility after concluding that ocean disposal of untreated wastewater conflicted with state and Federal water quality standards, created potential public health hazards in an area popular with fishermen and swimmers, and threatened valuable aquatic resources in the nearshore discharge zone.

The municipal treatment system was initially expected to serve an area extending from Lahaina town to Napili. A treatment capacity of 3.2 mgd would first provide treatment to Lahaina town (Phase I), followed by an additional 3.2-mgd increment that would serve the Napili-Honokowai area (Phase II). Third stage construction was expected to be an increase of 7.0 mgd (Phase III) that would accommodate additional growth throughout the entire service area. Thus, ultimate design capacity was tentatively targeted at 13.4 mgd, subject to a periodic review of actual demand.

Wastewater treatment facility design was started in 1972 for the current facility located mauka of Honoapiilani Highway, across from its intersection with the Honokowai access road. This site was selected for its mid-point location in a treatment service area extending from Lahaina to Napili. The facility began operation in 1980.

Initial wastewater flows in 1980 were approximately 2.2 mgd. Approximately 1.2 mgd of this flow originated at the Kaanapali resort. Recent flow rates have been lower as a result of lower water consumption, which is attributed to area-wide conservation efforts. Although the treatment facility was not sized to permanently accommodate Kaanapali wastewater, the County agreed to treat the flows since this additional volume was necessary to ensure proper operation of the new facility. In an April 1976 agreement the County agreed to treat up to 0.66 mgd of Kaanapali's wastewater at the new facility.

Current wastewater flows are approximately 2.9 mgd. The flow split between Kaanapali and Lahaina town is currently being verified. Parts of Lahaina town, the Wahikuli area, and nearly all residential areas between Honokowai and Napili continue to use private systems for wastewater disposal. Most of the condominiums, hotels, and commercial areas between Honokowai and Napili treat their wastewater in private primary treatment plants prior to subsurface disposal through injection wells.

2. Kaanapali Wastewater Treatment

Resort wastewater treatment was initially provided by a small package wastewater treatment plant. Constructed in the early 1960's with an initial design capacity of 0.26 mgd, the plant was later expanded to handle wastewater flows between 0.8 and 1.0 mgd.

The planned transfer of resort flows to the municipal treatment facility agreed to in 1976 was delayed by a series of startup problems. The undersized and deteriorating resort package treatment plant consequently continued to treat flows over its capacity while awaiting the operation of the new facility.

Between 1970 and 1979, primary treated flows in excess of 0.6 mgd were injected into PMCo.'s Well "G" for dilution before reuse in cane irrigation. However, following a failure of the irrigation pump, Well "G" was essentially used as an injection well with a resulting decrease in irrigation yield due to plugging of the well by the partially treated waste. Injection of wastewater into Well "G" ceased in November 1979.

Kaanapali resort's 1.8 mgd of wastewater is currently treated at the County treatment facility as provided by the Sewer Treatment Facilities Dedication Agreement. Well "G" has been cleaned and returned to its original use. The resort's package wastewater treatment plant has been closed and mothballed indefinitely.

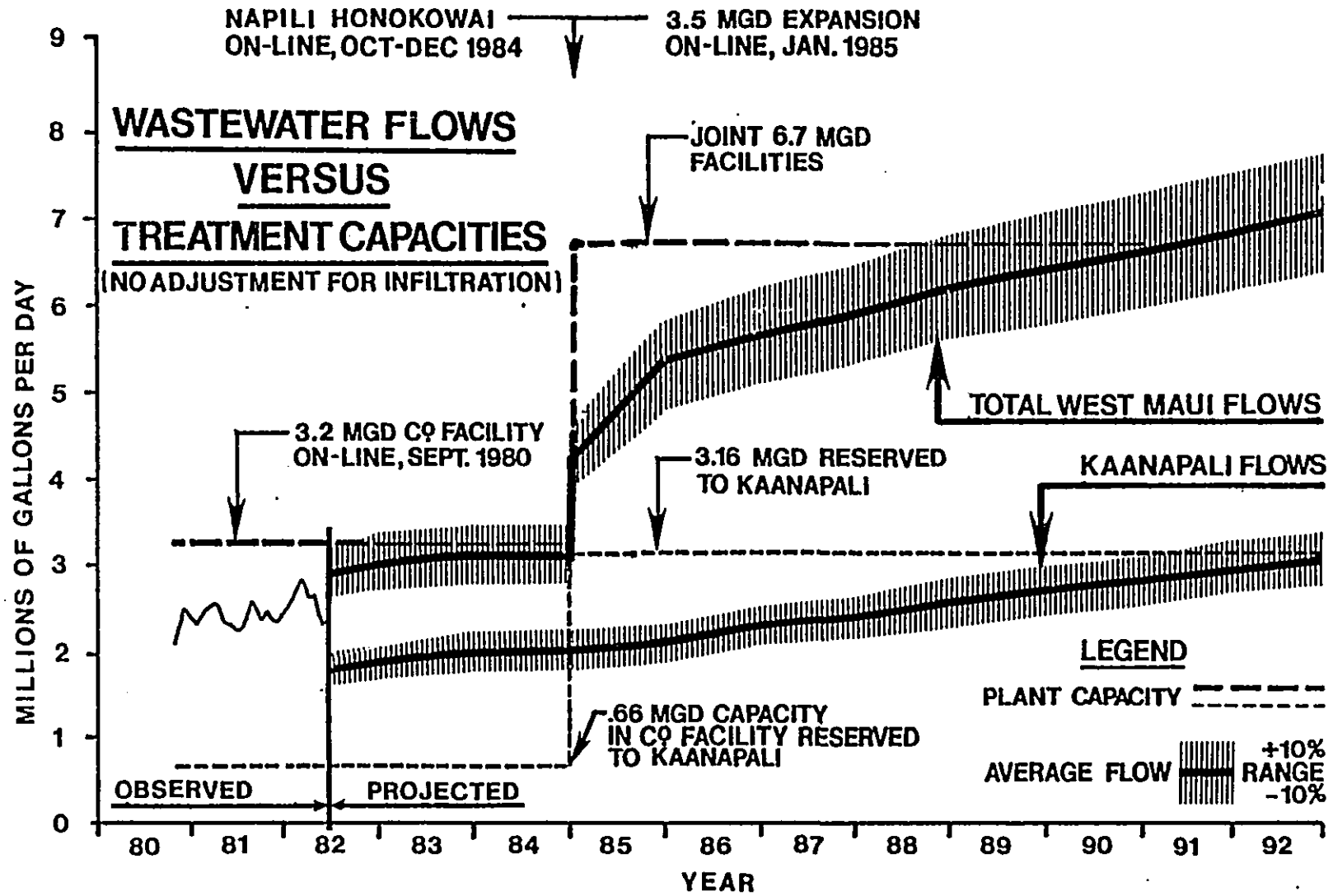

NAPILI HONOKOWAI
ON-LINE, OCT-DEC 1984
3.5 MGD EXPANSION
ON-LINE, JAN. 1985
WASTEWATER FLOWS
VERSUS
TREATMENT CAPACITIES
(NO ADJUSTMENT FOR INFILTRATION)
JOINT 6.7 MGD
FACILITIES
TOTAL WEST MAUI FLOWS
3.2 MGD Cº FACILITY
ON-LINE, SEPT. 1980
3.16 MGD RESERVED
TO KAANAPALI
KAANAPALI FLOWS
.66 MGD CAPACITY
IN Cº FACILITY RESERVED
TO KAANAPALI
OBSERVED
PROJECTED
LEGEND
PLANT CAPACITY
AVERAGE FLOW
+10%
RANGE
-10%
MILLIONS OF GALLONS PER DAY
0
1
2
3
4
5
6
7
8
9
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR

FIGURE 2

Section I
PROPOSED ACTION

A. WEST MAUI WASTEWATER TREATMENT NEEDS

1. Goals and Objectives

The Lahaina Judicial District is located on the western slopes and coastal plain of West Maui, as shown on Figure 1. Urban settlements and tourist destination areas are concentrated in a narrow band along the shoreline between the communities of Lahaina and Kapalua. The developed areas are set against a higher elevation backdrop of rolling sugarcane and pineapple fields and the West Maui Mountains.

Population and urbanized areas in Lahaina District have grown rapidly over the last 20 years, primarily in response to development of an extensive and profitable visitor industry. Lahaina District faces the dual challenge of providing adequate housing, infrastructure, human services, and economic opportunities while maintaining the agricultural industries and small town settings that have historically characterized this region. The responsibility to satisfy these contrasting needs lies with the County of Maui in concert with the West Maui community. Decisions will be directed by the region's land use and development plans. Continued growth is projected in both residential and resort uses.

It is the County of Maui's objective to ensure that wastewater generated by current uses and future development is thoroughly treated according to the standards of the State Department of Health (DOH). Amfac Property Corporation (Amfac), a major landowner and developer, also needs adequate wastewater treatment capacity for both existing uses and continued development of the Kaanapali Beach Resort. Additional resort and residential uses are consistent with both the Lahaina General Plan and the proposed Lahaina Community Plan.

The County of Maui and Amfac propose to construct a new wastewater treatment facility as an expansion to the existing County treatment facility in Honokowai. The expansion will occur on an 8-acre site adjoining the County treatment facility immediately mauka of Honoapiilani Highway at the turnoff to Honokowai. The proposed facility expansion will be funded and built by Amfac. It will be operated, and ultimately owned, by the County Department of Public Works.

The proposed facility expansion is needed by the residents of West Maui, the County of Maui Department of Public Works, and Amfac. The existing County wastewater treatment facility's capacity of 3.2 million gallons per day (mgd) is

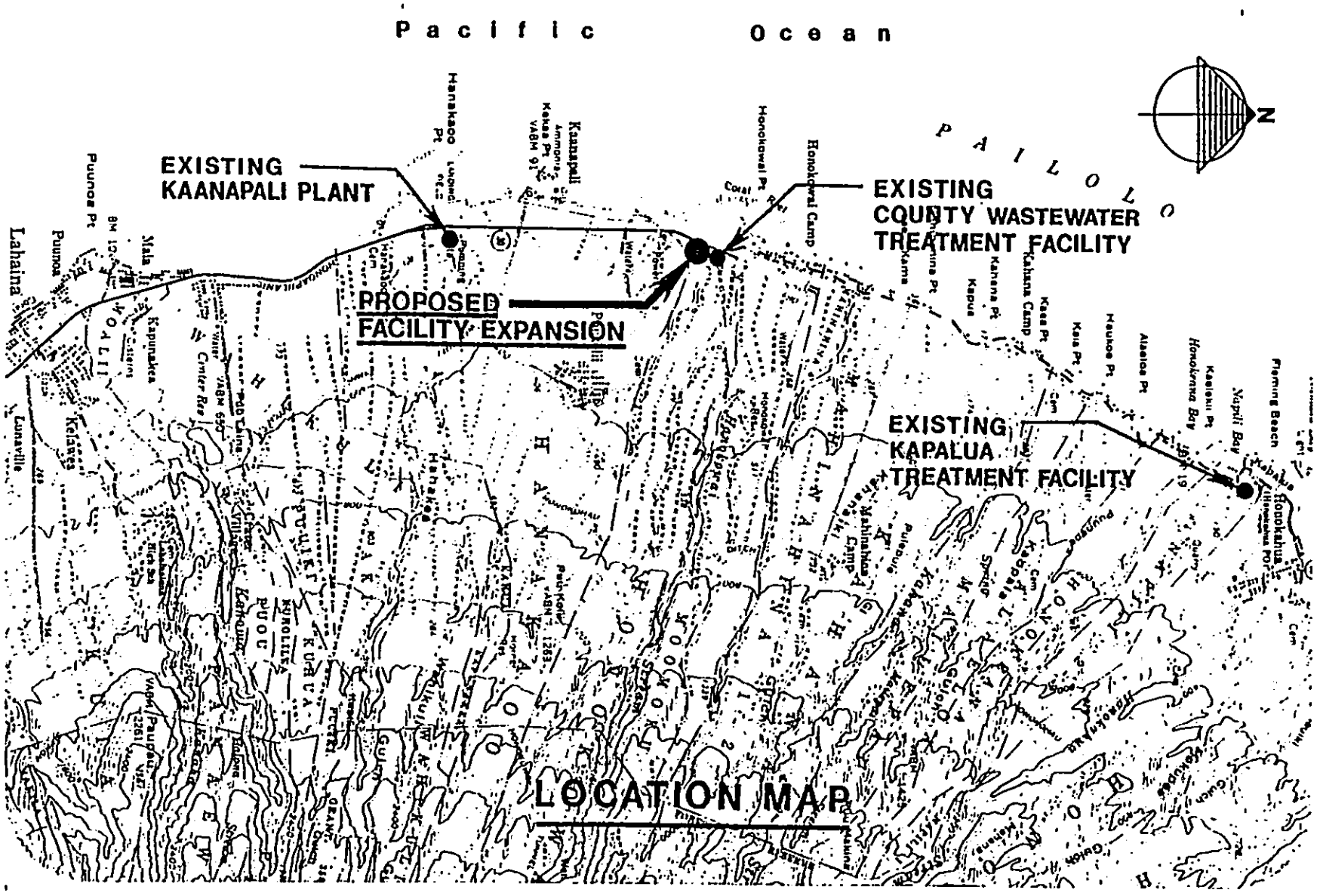

Pacific Ocean
EXISTING KAANAPALI PLANT
EXISTING COUNTY WASTEWATER TREATMENT FACILITY
PROPOSED FACILITY EXPANSION
EXISTING KAPALUA TREATMENT FACILITY
N
LOCATION MAP

FIGURE 1

- Construct a private facility for Kaanapali wastewater.
- Increase capacity of proposed facility expansion.
- No action or postponing action.

G. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Both short-term and long-term environmental gains include eliminating potential hazard to the public's health, safety, and welfare; eliminating any likelihood of groundwater contamination from inadequate wastewater treatment; and providing a significant volume of high quality nonpotable water usable for irrigation purposes. These gains outweigh the short-term losses of disrupted local conditions resulting from construction activities and the long-term effects of planned municipal and resort growth.

H. MITIGATING MEASURES

The widespread substitution of drip for furrow irrigation systems throughout the PMCo. plantation can be regarded as a mitigation measure to offset expected income losses from decreases in cultivated acreage.

Dust, erosion, and noise impacts typically caused during construction can be mitigated through construction controls.

I. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Development of the facility expansion precludes any other use of the intended site during its 20-year design life. The 8-acre site will be permanently lost to sugarcane production. The materials and energy that this project requires cannot be recovered.

J. OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENT POLICY THAT OFFSET ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The proposed facility expansion will ensure that all wastewater originating from both the West Maui communities and the Kaanapali Beach Resort receives the highest possible level of treatment. Existing water quality hazards in the Napili-Honokowai area will be resolved, and future development can occur while maintaining a high level of regional water quality.

Section II
DESCRIPTION OF PROJECT AREA AND ENVIRONMENTAL SETTING

A. PHYSICAL CHARACTERISTICS

1. Physiography

The proposed facility expansion site occupies the lower section of PMCo.'s Field 300 (portion of TMK 2nd 4-4-02:3). It is approximately 8 acres in size. Site elevations range from 20 feet to 30 feet above mean sea level with a 2 percent slope. The site is bordered by a car rental/transportation center to the south or Lahaina side; a cane haul road and cane fields to the east or mauka side; and the Honoapiilani Highway to the west or makai side. The existing County treatment facility is on the north or Napili side.

2. Geology and Soils

The project site is generally underlain by gravel alluvium deposited by Honokowai Stream. Four soil borings, ranging from 25 to 30 feet in depth, were recently taken in different portions of the site. In general, the upper 3 feet of the cores show loose brown silt, with some gravel and cinders. The next layer, 3 to 5 feet in depth, is a more compacted brown silt partially intermixed with fine sands and gravels. Soils in the layer 5 to 25 feet deep range from moist grey-brown to brown, clayey silt to sandy silt with some fine sand. Below 20 to 25 feet, the soil is a fairly uniform dark silty sand, both moist and of medium density.

According to the U.S. Soil Conservation Service's Soil Survey of Islands of Kauai, Oahu, Molokai, Maui and Lanai, the predominant soils at the project site are classified as Ewa Silty Clay Loam (EaA). These alluvial soils are characterized by moderate permeability, slow runoff, very slight erosion hazard, and slopes of 0 to 3 percent. These soils also have a moderate shrink-swell potential and low corrosivity. Pulehu silt loam (PpA) soils with 0 to 3 percent slopes are also present on the site.

The proposed site is currently planted in sugarcane. The Land Study Bureau of the University of Hawaii has assigned this area an overall productivity rating of "A" and a sugarcane productivity rating of "a," indicating high suitability for sugarcane. The crop Capability Class for these soils is I if irrigated (indicating few limitations to restrict their use) and IVc if not irrigated.

B. BIOLOGICAL CHARACTERISTICS

Ecosystems that once occurred naturally have long since been eliminated from the site by cane production. Small mammals

such as rodents, birds, and mongooses are likely to periodically inhabit the site when cane is growing.

C. HYDROLOGY

Although the proposed facility expansion site is located near Honokowai Stream, it is not within a 100-year riverine flood zone or a coastal high hazard (tsunami) zone as defined by the County of Maui Flood Insurance Rate Maps. The site is, however, located within an area of minimal flooding and designated as Zone C on the County's flood maps. There are neither permanent nor intermittently flowing streams on the project site.

The project site is located at the downstream end of an unnamed tributary watershed immediately south of Honokowai Stream. This tributary watershed, called herein the "Kaanapali North Gulch," contains an area of approximately 1,820 acres. It is expected to discharge approximately 1,970 cfs in a 100-year storm event. At a point approximately 1,000 feet mauka of the proposed facility expansion site, the Kaanapali North Gulch loses its well-defined stream shape and fans out over existing PMCo. cane fields. This fan slows the water down and distributes it over a wide area. About 1,000 cfs passes through the project site in a 100-year storm. The remaining flows continue south, down PMCo.'s cane haul road toward the transportation center and Lahaina. Flood depths predicted for the 100-year storm are expected to be 1.5 to 2 feet at the project site.

Four soil borings were taken on the site. Groundwater was encountered at approximately 2 feet above mean sea level. According to Stearns and Macdonald (Geology and Groundwater Resources of the Island of Maui), known volcanic dike locations and groundwater movement patterns indicate a channelling effect that causes fresh water to migrate from the West Maui Mountains towards the northwest, rather than directly downslope towards the proposed facility expansion. The area's basal water lens is known to be thin, partly due to the absence of a barrier rock formation along the shoreline and possible natural geological restrictions on groundwater recharge.

While the proposed facility expansion's impervious surfaces will minimally reduce the site's natural recharge abilities, this small net recharge loss will not harm the basal lens. If effluent were recycled for PMCo. irrigation, irrigation withdrawal from the lens via coastal wells would be minimized.

D. CLIMATE

The average annual temperature in the vicinity of the project site is 75.8 degrees Farenheit with annual rainfall ranging

between 13 and 29 inches. Northeasterly trade winds prevail year round, although they are often broken by southerly Kona winds in the winter.

E. AIR QUALITY AND AMBIENT NOISE

Air quality in West Maui is good, due to low emission levels and the almost continual presence of trade winds or on-shore breezes. The main sources of emissions and particulate matter in the district are vehicular traffic, the PMCo. smokestack in Lahaina town during the 9-month cane processing season, smoke from cane fires, and dust eroded from fallow cane fields. The near constant breezes and absence of confining topography prevent these emissions from degrading the area's pristine air quality.

Ambient noise levels around the project site are fairly low for this urbanizing area. Vehicular traffic on both the Honoapiilani Highway and the mauka cane haul road and daily mauka-directed takeoffs and landings at the nearby Kaanapali small plane airfield comprise the sources of noise in the project vicinity. Autos on the highway register about 55 dBA, while pineapple trucks register about 65 dBA. Mauka aircraft takeoffs, as measured at the runway, register about 75 dBA for several seconds.

F. ARCHAEOLOGICAL RESOURCES

The State Historic Preservation Officer indicates (Appendix C) that the proposed facility expansion site and lands in its immediate vicinity contain no known features of historic or archaeological significance that are either listed or proposed for inclusion on the State and National Historic Registers. However, should any such features be discovered during site preparation and construction, the State Historic Sites Office will be contacted immediately, and work affecting these features will stop until appropriate safeguards have been implemented. The regulations and procedures of the State Historic Sites Office will be upheld.

The site contains no significant cultural resources by virtue of its long-term use for sugarcane production.

G. POPULATION GROWTH TRENDS

Maui County had a 1980 population of 70,991, while the island of Maui itself had 62,823 persons in the same year. Lahaina District had a 1980 resident population of 10,284, up 86 percent from 1970 (5,524 persons) and up 112 percent from 1960 (4,844 persons). This rate of growth is the highest in Maui County for the period 1960 to 1980, and the third highest between 1970 and 1980 following Kihei-Makena and Makawao-Pukalani-Kula (Hastings, Martin, Chew and Associates, 1981).

The district's rapid rate of growth is widely attributed to the boom in tourism industry development and an influx of population to work in the accompanying service industries.

The Lahaina town environs were the most populous sector of the district in 1980 with approximately 6,551 persons, 64 percent of the district's total population. The Napili-Honokowai area followed with approximately 2,900 persons (28 percent), then Kaanapali with 505 residents (5 percent), and lastly, Honokahua with 308 persons (3 percent). Honokahua is tallied separately here because it is an outlying area north of Kapalua, and is not scheduled for sewerage service (Final Field Counts from 1980 Census, August 1980).

Projections to the years 1990 and 2000 indicate 69 percent and 157 percent increases to 17,400 and 26,400 persons, respectively, in Lahaina District (Hastings, Martin, Chew and Associates, 1981). However, during the community plan preparation process, Lahaina residents chose to pursue a controlled growth strategy, which will facilitate maintaining the region's small town and village character. To accomplish this, a year 2000 population guideline of 20,000 was adopted (proposed Lahaina Community Plan). Appendix A includes a wastewater demand analysis with detailed population growth assumptions and projections.

Overnight westbound visitors to Maui County numbered about 1,464,000 in 1980. While down 8/10 of 1 percent from 1979, Maui County has otherwise experienced dramatic increases in its tourist population over the last 17 years. Annual visitor counts have grown by 47 percent since 1975, 196 percent since 1970, and 594 percent since 1965. Maui County's share of the state's total tourist population has also grown, from 37 percent in 1965 to 48 percent in 1980 (Hastings, Martin, Chew and Associates, July 1981). This is largely in response to development of both the Kaanapali and Kihei-Makena areas as primary visitor destination areas in the last two decades.

While the future rate of growth is not anticipated to be as rapid as in the past, the visitor population in Maui County is nevertheless expected to continue increasing, as shown in Table 1.

It is assumed that the proportion of county visitors staying overnight in Lahaina and its environs will approximate the proportion of the county's visitor units located in the Lahaina area. While the actual number of visitor units in West Maui will be increasing, the district's overall percent capture rate should slowly drop in response to the growing availability of accommodations in the Kihei-Makena area.

Table 1

PROJECTED VISITOR POPULATION

	Overnight Visitors to		Average Daily Census	
Year	Maui County[a]	Lahaina (% total)	Maui County[a]	Lahaina
1980	1,464,000	919,400 (62.8%)	13,200	8,300
1985	1,980,000	1,116,700 (56.4)	18,200	10,300
1990	2,290,000	1,222,900 (53.4)	21,300	11,400
1995	2,640,000	1,309,400 (49.6)	25,000	12,400
2000	2,728,000	1,353,100 (49.3)	26,200	12,900

[a]Source: Hastings, Martin, Chew and Associates, Ltd., July 1981.

H. LAND USE PATTERNS

1. District-wide Land Use

Urban development in Lahaina District occurs in a narrow coastal belt from Lahaina town to Kapalua and is confined to this area by the current boundaries of the state urban land use district. Most urbanized areas are makai of the Honoapiilani Highway. The more notable exceptions are the Lahainaluna Road residential developments and schools mauka of Lahaina town; the Wahikuli and Kapunakea residential areas; the Kaanapali resort residential areas; and the Kapalua resort residential areas. Throughout the district, residential development occurs at urban densities with lots typically ranging from 6,000 to 12,000 square feet in size.

Hotels, condominiums, apartments, and commercial developments occur throughout the district. Commercial facilities and enterprises are concentrated in Lahaina town, while tourism facilities are centered in Kaanapali, Honokowai, and Kapalua. Lahaina District agricultural enterprises are focused around PMCo. and Maui Land and Pineapple Company operations. The district, by and large, lacks the small-scale farms that characterize other parts of Maui, most notably the upcountry area.

Maintaining the small town character desired by Lahaina residents entails a dispersed pattern of growth that, while costly in terms of infrastructure, is expected to minimize impacts on agricultural lands. The more outlying areas seen as fulfilling this plan include a mauka expansion at the Napilihau residential community, in the northern end of the district; southern sites center on Olowalu with satellite villages at Ukumehame and Launiupoko. The controlled growth strategy laid out in the proposed Lahaina Community Plan foresees incremental expansion occurring in three phases, as follows:

Phase I: (Short-term; first 5 years)

- Infill at Honokowai-Napili
- Minor expansion mauka of Honoapiilani Highway at Napilihau (Project District No. 2: "Napilihau Mauka")
- Infill at Lahaina
- Residential development at Kapunakea
- Residential development within Wainee Village
- Residential development around Crater Reservoir

Phase II: (Medium-term; within 10 years)

- Napilihau Mauka expansion
- Incremental residential expansion at Olowalu (Project District No. 4)
- Residential development at Ukumehame, mauka of Honoapiilani Highway
- Contributions to the residential housing supply at Kaanapali North (Project District No. 3)

Phase III: (Long-term; within 20 years)

- Launiupoko Makai
- Launiupoko Mauka
- Continued incremental residential expansion at Olowalu
- Continued incremental expansion at Kaanapali North

As is evident, future growth will largely be diverted away from its current concentration around Lahaina town.

About 7,900 housing units are currently occupied by residents in the Lahaina District (Hastings, Martin, Chew and Associates, July 1981). Resident housing supply falls short of demand, as evidenced by high rents and mortgages, widespread overcrowding, and the large numbers of employees who commute daily from other districts on Maui. The shortfall is, in part, due to low replacement rates for demolished or abandoned plantation housing, and a rising household formation rate.

Based on projected growth in population and employment levels, the proposed Lahaina Community Plan anticipates that resident housing demand will increase from 4,200 units in 1980 to 10,300 units in 2000, in addition to the existing supply. Approximately 64 percent of the 1980 units were estimated to be single family, and the remainder are multi-family. The proposed plan anticipates that this will change to about 50 percent of each by 2000. While single-family housing is apparently still preferred over multi-family housing, this attitude may slowly change as rising land and construction costs stimulate the demand for lower cost, more affordable multi-family units.

The County anticipates construction of some low to moderate income public housing developments during the 1980s. Plan-

ning Department staff expect these developments to be located in the Lahaina town vicinity, below Wainee Village and abutting on Honoapiilani Highway; and in Napili immediately mauka of the Napilihau residential development. The Napilihau extension site could accommodate approximately 72 single-family lots, while the Wainee Village site, currently being considered by its owner, Amfac, for dedication to the County, could initially contain 100 multi-family units. The Wainee Village site would require redistricting from agriculture to urban by the State Land Use Commission.

Other areas in West Maui possibly available for public housing include Honokowai where the State of Hawaii Housing Authority owns both remnant parcels and the former Honokowai School site; and in Napili where Maui Land and Pineapple Company may develop multi-family housing on company-owned property mauka and northeast of the Napilihau development.

West Maui's visitor accommodation inventory stood at about 6,700 units at the end of 1980, or about 63 percent of the units countywide. Sixty percent were hotel units and the balance multi-family units. A steadily increasing visitor population growth rate will necessitate expanding the inventory to about 11,000 units by 2000, based upon a projected 70 percent occupancy rate. By 2000, West Maui visitor units will represent 49 percent of all visitor units in the county (Hastings, Martin, Chew and Associates, July 1981).

Demand for retail space in West Maui should rise markedly by 2000 due to increased expenditures by both visitors and residents. The proposed Lahaina Community Plan projects future retail space demand as a function of anticipated growth in both visitor and resident populations and in household incomes. Using a daily visitor expenditure rate of $275 per square foot for existing retail visitor activities, visitor retail space demand should increase from 295,000 square feet in 1980 to 455,000 square feet by 2000. Assuming that 40 percent of the Lahaina District's 1980 average household income of $21,900 is expended annually on resident retail purchases (equivalent to $190 per square foot of existing retail space), resident retail space demand should rise from 184,000 square feet in 1980 to 545,000 square feet in 2000.

Thus, overall retail space demand in West Maui is projected by Hastings, Martin, Chew and Associates to more than double by 2000. The total 1 million square feet needed to meet both visitor and resident needs is equivalent to approximately 23 acres in retail floor area alone, and does not include the additional acreage needed for common areas and onsite parking. At present, there is insufficient land zoned and available for such uses in West Maui. Until additional retail facilities are constructed, both visitors and residents will continue to rely on Central Maui's more extensive retail facilities for shopping.

Based on projected employment levels in West Maui, commercial office space demand is expected to more than double from 1980's demand for 257,000 square feet to 584,000 square feet by 2000 (Hastings, Martin, Chew and Associates). Commercial office space is concentrated around Lahaina town and will likely remain in that area. Only small isolated increases are likely in the residential and resort communities between Honokowai and Kapalua.

Additional light industrial, repair service, warehousing, and distribution space will be needed in the Lahaina District based on projected increases in population and associated retail activities. Demand may grow rapidly due to the combination of distance from the primary industrial facilities around Kahului Harbor, and the desire of district residents, as expressed in the proposed Lahaina Community Plan, to diversify the district's economy away from the historically dominant activities of agriculture, tourism, and visitor-oriented services.

West Maui industrial land use demand is anticipated to rise from 50 acres in 1980 to 150 acres in 2000 (Hastings, Martin, Chew and Associates). This high rate of increase is paralleled in Maui County only by that in the Kihei-Makena urban area. Both areas, however, are currently and will in the future be dominated by the extensive Wailuku-Kahului industrial areas. Light industrial facilities in West Maui are currently clustered in the vicinity of Limahana Place on the northerly edge of Lahaina town. The proposed Lahaina Community Plan designates this area plus the vacant lands along Kapunakea Street and around the transportation center at Kaanapali to accommodate future light industrial and warehousing needs.

2. Kaanapali Resort Land Use

Amfac's Kaanapali development plans directly comply and are consistent with the Lahaina General Plan and the proposed Lahaina Community Plan. Further resort growth is expected, primarily at Kaanapali and Kapalua. This growth will support West Maui's expanding visitor industry. The Lahaina area plans specify that both tourism-oriented and residential uses are the preferred urban uses for selected lands that are currently cultivated for sugarcane. These lands include the urban-zoned North Beach properties and the agriculturally zoned areas mauka of the Honoapiilani Highway between the golf courses and Honokowai Gulch. In designating these lands for urban uses, the local government and the community have weighed the results of further growth and concluded that the effects are manageable in light of the benefits from accommodating tourism and residential growth in a quality environment such as Kaanapali.

Future resort development will be planned at low-to-medium densities in both hotel and residential districts, in accordance with the Lahaina District's plans and to maintain the quality and desirability of the Kaanapali area. Incremental growth is supported by Amfac. Groups of parcels will be developed cohesively to maximize the orderly layout of resort utilities and support facilities. Open spaces, designated in the district plans as mountain-to-sea visual corridors between developments, will be maintained.

Six hotels and six condominium complexes are currently located in the Kaanapali resort. An additional condominium complex, the Kaanapali Alii, began operation in 1982. The resort has two commercial areas: the Whalers Village and the golf clubhouse. The two residential areas mauka of the Honoapiilani Highway are currently occupied, with another (Kaanapali Hillsides Units I and II) to be finished in 1984.

By 1985, the Kaanapali resort will contain 5,158 hotel, condominium, and residential units on approximately 279 acres. However, since the Kaanapali Hillsides developer has made a separate wastewater treatment agreement with the County, Amfac must consider only 4,999 units on 207 acres in its own wastewater treatment projections. These units could collectively generate 1.58 mgd of wastewater at a rate of 300 gallons per unit daily (gpud) for hotels, 360 gpud for condominiums, and 350 gpud for residences. An additional 110,000 gallons should be generated daily from the resort's two commercial facilities, based on 6,000 gallons of wastewater per acre generated daily from each of the 18.2 commercial acres.

Infiltration or seepage by groundwater (and seawater when lines lie below sea level) into the wastewater collection pipelines increases the volume of wastewater reaching the County treatment facility by approximately 14 percent daily. The volume of resort groundwater infiltration is estimated at 1,030 gallons per developed acre per day, or approximately 232,000 gallons daily by the end of 1985. The Kaanapali resort could generate approximately 1.92 mgd by the time the proposed facility expansion comes on-line. This wastewater demand would be generated from 4,999 hotel, condominium, and residential units; two commercial facilities; and infiltration on 225 acres.

After the proposed facility expansion comes on-line between late 1984 and early 1985, further resort development might occur on the coastal North Beach lands extending between the Royal Lahaina Hotel to the south and the highway turn-off to Honokowai to the north. This area, contained within the state urban land use district, is zoned for hotel use and may be developed as a low density, high quality expansion of the resort. These facilities could generate 0.73 mgd, including infiltration.

Should further development be considered feasible after hotel completion, attention would most likely shift to residential development mauka of the highway. The state and County have both zoned five parcels for urban use and ten parcels for agricultural use. The Lahaina General Plan designates seven parcels for apartment use and eight for residential use. The proposed Lahaina Community Plan proposes several different uses, the predominant ones being planned development and residential uses.

In summary, the Kaanapali resort could ultimately generate an average 3.71 mgd of wastewater from 10,100 units and two commercial areas on 536 acres. It should be noted, however, that commitments have not been made for any developments past 1985.

I. SOCIAL RESOURCES

The Lahaina District is characterized by a fairly young population, with nearly 65 percent being 40 years of age or younger, according to the 1975 Maui Economic Opportunity (MEO) Census Update Survey. A full third of the population is age 20 or younger. Nearly half of Lahaina District residents were born in Maui County, while 80 percent have lived on Maui for either their entire life or for the entire duration of their life in the State of Hawaii.

Of the population 18 years of age or older, about 38 percent have completed high school while 10 percent have received a bachelor's degree from college. Nearly 50 percent of the work force in 1975 classified themselves as working in clerical, sales, and services positions; 23 percent in professional, managerial, or technical positions; 15 percent in construction, manufacturing, or processing positions; and 7 percent in agriculture or fishing. Approximately 92 percent of those 16 years of age or older in 1975 and having personal income, earned $15,000 or less annually, while one-third of the households earned less than $10,000 annually (1975 MEO Survey).

The Lahaina District has undergone dramatic change since the early 1960s: physically through changes in land use, economically through changes to employment and business structure, and socially through transformations of communities and lifestyles. These changes have occurred in response to population growth, substantial in-migration, and development of the tourism industry. The resident population has grown more than 200 percent since 1960, and more than 186 percent in the last decade alone. Meanwhile, expansion of the housing supply has lagged far behind the rate of population increase. As a result, high housing costs and widespread overcrowding has occurred. Employment and business structure have been significantly altered, from a more traditional

agriculture and food processing orientation to one dominated by visitor activity and service industries, retail trade, and finance and real estate. Employment availability has improved markedly. Between 1964 and 1975, jobs in the Lahaina District increased 165 percent, the largest percentage gain in the county during this period. Increased job availability has slowed the previously common out-migration of job seekers.

Community structure has been permanently transformed, in large part due to population growth and secondary effects from development of the tourism industry. The changes affecting the more traditional local patterns in life have included the high profile presence of a growing visitor population; the large influx of newcomers seeking either service industry employment, retirement or second homes; corresponding alteration of area ethnic and racial composition; widespread increases in densities and costs of housing; simultaneous decreases in open space and shoreline access; soaring property taxes and land costs; changes in land use due to widespread high density zoning; and increased pressure on roads, utility systems, and shoreline recreational amenities.

The effects of such rapid and widespread changes on community affairs and relationships are varied, and due to the diverse range of personal perceptions and reactions, can only be generalized. In-migration has brought new residents, many of whom, with little understanding of the local social patterns, have subsequently sought local changes based on the socio-cultural patterns of their previous places of residence. They have occasionally been met with hostility and resistance. Conversely, other new residents, more sensitive to local styles and behavioral patterns, have been accepted and able to contribute to their communities, thus enriching and bringing greater diversity into the lives of long-term residents. While the greater concentrations of people have caused an increase in social breakdown (family disorders, divorce, alcoholism, drug abuse, juvenile delinquency, adult crime), the rate of such breakdown has not seemed to grow appreciably. Increased costs of living and employment availability often cause family changes, most notably the addition of wife and mother to the work force which, while increasing family income, can also result in stressful role changes and less child supervision.

Community business structure normally changes in response to rapid population growth and development, with more small businesses being taken over or started by newcomers. Such new enterprises, being unfamiliar to long-term residents, usually also have higher overhead, which is typically passed along to consumers as higher prices. Rising costs and increases in commercial enterprises often occur in tandem with rising property values and taxes. This eventually

results in better roads and other public improvements, but also increases the cost of living. Greater employment availability, while attracting many newcomers, also has local benefits in the form of less out-migration for work. This results in less family dissolution, reduced costs of public assistance and unemployment benefits, less idleness and delinquency among youth entering the labor force, and restoration of self-reliance and pride among the unemployed obtaining work.

Perhaps the most difficult effect of population growth and area development to assess is the widespread transformation of open space to occupied space. Rapid urbanization in an otherwise largely undeveloped region often causes resentful reaction among long-term residents who believe the wholesale loss of open space compromises their lifestyles for the benefit of too few. Adverse reaction to such change can be expected by those who place a premium on keeping the region in its "natural" undeveloped state. Cynicism and wariness have consequently become evident among many residents, and decrease the likelihood of their judging and accepting future developments based on individual merits alone.

J. ECONOMIC RESOURCES

The primary economic activities in the Lahaina District are services, retail trade, and finance-insurance, in descending order of employment (see Table 2). Together these three industries provided 75 percent of all jobs in the Lahaina District in 1975. The service industries alone provided 40 percent of all jobs, the majority of which were in the hotel and visitor activity industry. Retail trade is also heavily oriented toward a tourism market. Agriculture is a declining industry in terms of number of employed in the Lahaina District, Maui County, and statewide. In 1975, only 10 percent of the employed in the Lahaina District worked at agricultural jobs, a decline from 40 percent in 1964.

If employment levels by industry in Lahaina District changed in direct relation to the County-wide trends exhibited between 1975 and 1980, then the service, retail trade, and finance-insurance industries would have continued to dominate the district in 1980 and collectively employ nearly 84 percent of the district's resident labor force. Service industry employment alone would have increased to nearly 50 percent of total, a reasonable likelihood given the number of major new hotels and condominiums now in operation. Agricultural employment would have declined further, from 9.9 percent in 1975 to 8.2 percent in 1980.

In 1977, Maui County had approximately 1,500 wholesale, retail, and service establishments. Of these, 32 percent of the retail, 5 percent of the wholesale, and 20 percent of the service establishments were located in the Lahaina

Table 2

INDUSTRY OF EMPLOYED POPULATION

	Maui County[a] 1980	Maui County[b] 1975	Lahaina District[b] 1975	Maui County[c] 1970
Agriculture	10.7%	12.9%	9.9%	23.7%
Manufacturing	9.2	8.8	9.9	13.3
Transportation, communications, commodities	5.8	6.8	1.0	6.8
Wholesale trade	2.2	2.4	0.5	
Retail trade	21.5	21.7	24.0	18.0
Finance, insurance	7.5	7.2	11.8	2.4
Service	28.8	24.3	40.0	17.8
Government	14.3	14.1	3.2	17.4

Note: Excludes self-employed and contract construction workers.

[a]Source: State of Hawaii Department of Labor and Industrial Relations, Labor Force Distribution by Employer Site and Industrial Category (May 1982).

[b]Source: Ibid. (March 1975).

[c]Source: 1971 Data Book, State of Hawaii Department of Planning and Economic Development.

District. As shown in Table 3, the Lahaina District provided nearly one-quarter of the countywide gross business revenues from 25 percent of the total number of establishments existing in 1977.

Such a strong economic showing was made despite the Lahaina District's lack of a sizable population base, when compared with the combined Wailuku-Kahului urban area. The proportion of such revenues generated by West Maui probably rose between 1977 and 1980, since local establishments are anticipated to have increased in number during this period. Commercially zoned space is limited in West Maui; therefore, the future rate of growth in the number of business establishments may be constrained.

Since 1964, the number of available jobs has increased faster in the Lahaina District than elsewhere in the county. Job count rose 165 percent between 1964 and 1975, and 89 percent between 1975 and 1980, for a 1980 total of 10,200 jobs. This is equivalent to 32 percent of all available jobs in the county, and is second only to the Wailuku-Kahului area, which contains 44 percent of the available jobs. While the Lahaina District had 32 percent of the jobs in 1980, it had only 14.5 percent of the population and therefore could not fill its own labor demand. The proportion of jobs appears to continue to increase faster than the share of population. This trend, also apparent in the Kihei-Makena area, has become increasingly evident since the early 1960's. It is widely acknowledged that a large portion of West Maui's labor force commutes daily from Kihei-Makena, Wailuku-Kahului, and upcountry.

The Kaanapali resort is a major employment center, both island-wide and in the Lahaina District. Its predominant long-term employment categories include hotel, restaurant, retail, and resort management services. In 1982, the resort had approximately 5,000 employees in these categories, thus offering the majority of service jobs in the region. This level of employment represented 44 percent of the 11,300 jobs available in the Lahaina District in 1982, and 13.2 percent of the 37,600 jobs expected for the same year county-wide (Hastings, Martin, Chew and Associates). Construction, while less consistent in numbers of continually employed persons, periodically offers sizable employment opportunities.

The Lahaina Community Plan projects that employment will increase 92 percent to 19,600 jobs by 2000. At that time, the Lahaina District will have approximately 35 percent of the county's jobs and 23 percent of the population. The most rapid 5-year period of job increase is projected to occur between 1980 and 1985, when available jobs are expected to increase by 27.5 percent to 13,000.

Table 3

1977 GROSS RECEIPTS FROM COMBINED WHOLESALE, RETAIL, AND SERVICE ESTABLISHMENTS

	Number of Businesses (% total)	Gross Receipts (% total)
Maui County	1,509	$570,985,000
Kahului	322 (21.3%)	272,635,000 (47.7%)
Wailuku	333 (22.1)	79,255,000 (13.9)
Lahaina	380 (25.2)	127,911,000 (22.4)
Other	474 (31.4)	91,184,000 (16.0)

Source: 1981 Data Book, State of Hawaii Department of Planning and Economic Development.

Precise labor force statistics are not available for the Lahaina District. It is assumed that since in 1975 about 60 percent of the population was of working age (i.e., between the ages of 20 and 65), that the labor force is roughly equivalent to 60 percent of the population. Therefore, in 1980, the resident labor force numbered some 6,200 persons. If all of these people were fully employed, about 4,000 jobs would still be open. By 2000, the labor force will be approximately 12,000 persons if the district's population growth is held to 20,000, as recommended by the proposed Lahaina Community Plan. At that time, there would be about 7,600 jobs left unfilled by Lahaina residents. It is expected that residents from Wailuku-Kahului, Kihei-Makena, and upcountry will continue to fill the slack in labor force in the Lahaina District.

Unemployment reached 9.6 percent of Maui County's population during September 1982, equivalent to about 7,350 persons (assuming population growth as projected by Hastings, Martin, Chew and Associates in 1981). Unemployment for the State of Hawaii during the same period was 7.9 percent. There was a sizable increase in the unemployment rate for Maui County between December 1981 and September 1982: from 5.5 percent to 9.6 percent. A steady year-long decline in construction industry employment, cutbacks in government employment, and seasonal slowdowns in agriculture, trade, and industries are thought to be responsible for this increase in unemployment.

The 1980 average annual wage in Maui County was about $13,900, and varied quite widely according to industry (see Table 4). Household income in the Lahaina District in 1980 was $21,900, fourth highest in the county after Makawao-Pukalani-Kula, Kihei-Makena, and Wailuku-Kahului. The 1980 county average was about $20,800. Household income is projected to grow about 1 percent annually through 2000 (Hastings, Martin, Chew and Associates). At that time, in the Lahaina District, household income would average $26,700.

The proposed Lahaina Community Plan calls for further diversification of the district's economy to lessen West Maui's dependence on the visitor industry. Toward this end, additional lands have been proposed for industrial zoning to attract such new light industrial assembly enterprises as electronics manufacturing.

K. INFRASTRUCTURE

1. Water Supply

West Maui residents and businesses receive potable water from wells and streams in the West Maui Mountains. The Lahaina town area is served by Waipuka Well Nos. 1 and 2, Kanaha Wells A and B, and the Kanaha Stream surface intake.

Table 4

1980 AVERAGE ANNUAL WAGES BY INDUSTRY

	Average Annual Wages
Agriculture	$13,790
Manufacturing	15,320
Transportation	14,750
Communications, utilities	21,660
Wholesale trade	13,960
Retail trade	8,090
Finance, insurance	11,670
Service	10,130
Government	15,590

Source: State of Hawaii Department of Labor and Industrial Relations, 1980 Employment and Payrolls in Hawaii (September 1981).

The area extending from Wahikuli to Napili is served by Napili Well Nos. 1 and 2, and the Alaeloa surface intake. The current total yield of the above system is 8.1 mgd; its safe (or consistent, reliable) yield is 6.6 mgd. Both the Kaanapali and Kapalua resorts are served by private water systems.

Current maximum water demand in the municipal system is 5.1 mgd. This demand is expected to increase to 6.1 mgd by 1990 and to 8.1 mgd by 2000. Municipal water demand can thus be safely accommodated at least through 1990. The County Department of Water Supply is currently considering various alternatives for increasing source yields to meet future demand.

2. Electricity

Electricity is provided to West Maui by Maui Electric Company from its generating facility at Maalaea. Maui Electric Company engineering staff foresee no need to expand the capacity of their West Maui transmission lines at this time.

3. Solid Waste

Solid waste in the Lahaina District is disposed at the Olowalu sanitary landfill south of Lahaina town. Refuse collection services are provided by the County and private collection companies for a nominal monthly fee. The Olowalu landfill, operated by the County Department of Public Works, is expected to reach capacity in 2 to 3 years. By then, the County's planned refuse-to-energy plant is expected to be in operation. It will burn most, if not all, of the island's refuse. Location of a new landfill in West Maui may be necessary, however, to serve both as an interim measure until the waste-to-energy-plant is completed and to accommodate unburnable refuse and ash from the recovery plant.

4. Transportation

The principal access to West Maui is via Honoapiilani Highway. This two-lane state highway currently extends between Maalaea and Napili and has an average two-way designed capacity of 1,600 vehicles per hour. The highway was most recently extended from Honokowai to Napili to serve as an alternate route to the shoreline road. Another extension, between Napili and Pineapple Hill in the Kapalua resort, is under construction and will have a two-way designed capacity of 1,300 vehicles per hour. This section is scheduled for completion in December 1983, at which time Kapalua resort is expected to connect its internal road system to the highway to give vehicular access to the old shoreline road.

The final section of Honoapiilani Highway will run from Pineapple Hill to the planned terminus in Honokahua Valley.

The State Department of Transportation (DOT) will seek construction funds for this section in the 1985 fiscal year. If granted, construction will take place in 1985 and 1986 and will include a bridge across Honokahua Valley.

Honoapiilani Highway's average two-way designed capacity of 1,600 vehicles per hour is designed to safely accommodate a maximum 38,400 vehicles per average 24-hour period. Based upon the DOT 24-hour, two-way average daily traffic (ADT) counts shown in Table 5, Honoapiilani Highway does not experience overcrowded driving conditions. However, the ADTs are an average of all hourly traffic counts, regardless of time of day and day of week. Peak-hour traffic counts, if available, would indicate that overcrowding conditions regularly exist during specified weekday periods.

Concern about the ability of Honoapiilani Highway to safely carry future traffic loads has been expressed by local agencies and residents, especially given the currently heavy commute traffic to the district and daily congestion along the highway. Alternatives to alleviate traffic congestion between Lahaina town and Kaanapali are currently under study by DOT staff. Alternatives include a bypass road, increasing highway capacity to four lanes, and installing traffic signals and left-turn lanes at appropriate locations. When the preferred alternative(s) has been selected, DOT will seek state funds for construction.

L. PUBLIC SERVICES AND FACILITIES

1. Police Services

Police protection is provided from a district station located at the Lahaina Civic Center, approximately 3 miles south of the proposed wastewater treatment facility expansion site. The staff includes 48 police officers and 6 detectives that operate in 3 shifts. The station facility is now at its space capacity and requires expansion. Additional future staff will also be needed to serve the growing West Maui resident and visitor population. The appropriate rate of staff expansion has not yet been determined.

2. Fire Protection

The West Maui fire station is also located at the Lahaina Civic Center. The station is currently staffed by 18 firemen, working 6 per shift, and using 1 fire truck. The station was built to accommodate two full companies and therefore is sufficient to house existing and projected future staff. The fire chief has recommended that the staff be increased by 12 firemen, or 4 per shift, with 1 additional fire truck. He has further suggested that a new fire substation be located in the Kapalua-Napili area with a staff of 15 firemen, working 5 per shift, plus 1 fire truck.

Table 5

COMPARISON OF TRAFFIC COUNTS TO DESIGNED CAPACITY

Location	Two-way ADT Counts	Percent of Designed Capacity
Honoapiilani Highway at Launiupoko Bridge	10,064	26%
Honoapiilani Highway at Kaanapali Parkway (Lahaina side of intersection)	20,479	53
Honoapiilani Highway at Honokowai Bridge	7,909	21

Source: State Department of Transportation, Highway Planning Section, Traffic Survey Data: 24-Hour Accumulated Traffic Counts (September and October 1981).

3. Health Care

No hospitals are located in West Maui. Residents in need of such services must drive 30 to 40 minutes to Maui Memorial Hospital in Kahului. Several medical clinics are situated in the Lahaina District, however, as well as private medical and dental offices. The medical clinics include Island Medical, Kaiser Foundation, and Maui Medical Group. All are located in Lahaina town. Emergency medical care is provided by a private ambulance company on contract with the state. An ambulance team and staff are permanently stationed at the Lahaina Civic Center.

Maui Memorial Hospital, a state-owned facility, is the island's sole hospital. The hospital currently has 145 acute care beds, and in 1982 had 6,500 general admissions (excluding newborn) with an average length of hospital stay of 4.8 days. The hospital's medical staff currently numbers 420, including 213 nurses and nursing aides. An additional 115 private physicians practice at the hospital but are not employees. The hospital contains sufficient space to accommodate growing health care needs through the year 2000, with appropriate renovation of various unused areas. The hospital's old wing is slated for renovation within the next 5 years and upon completion will increase the number of beds to 180.

4. Education Services

West Maui is served by an elementary school, Kamehameha III, as well as Lahaina Intermediate School and Lahainaluna High School. The public schools' current and design enrollments are summarized in Table 6.

Kamehameha III's current enrollment exceeds the school's capacity of 630 students. Portable classrooms are housing the overflow. Lahaina Intermediate's current enrollment also exceeds the school's capacity since the sixth grade was recently moved from Kamehameha III. The overflow is being accommodated in portable classrooms. Additional facilities will be built to accommodate the intermediate school's projected design enrollment. Lahainaluna High School is already built to accommodate its year 2000 design enrollment.

Teaching staff size at the three schools is coordinated according to a student-to-teacher ratio of 26.15:1. The current sizes of the instructional (includes librarians and counselors) and support staffs at Kamehameha III, Lahaina Intermediate, and Lahainaluna High Schools are 37 and 14.75, 19 and 2.5, and 46 and 15.25, respectively. District personnel staff anticipate future increases in instructional and support staff in proportion to West Maui's expected increases in student body.

Table 6

WEST MAUI PUBLIC SCHOOL SYSTEM

Facility	Grades	Year 2000 Design Enrollment	1982-83 Enrollment	Current Capacity
Kamehameha III	K-5	1,070	738	630
Lahaina Intermediate	6-8	520	377	350
Lahainaluna High	9-12	920	701	920
		2,510	1,816	1,900

5. Public Transportation

There are no public transportation services in West Maui and such services are not expected to be provided in the near future. A private "shoreline transportation" bus operates between Kaanapali and Lahaina town, but its $3.00 round-trip fare has largely restricted its ridership to visitors.

6. Public Recreation

West Maui has 17 county parks, representing nearly 20 percent of the total 1980 inventory of 89 county parks. Approximately one-third are located along the shoreline; the rest are situated inland of the shoreline and include recreation centers, subdivision parks, and historic site parks. Public amenities are currently under construction at Hanakao'o Park, the coastal site used by canoe clubs immediately south of the Kaanapali resort. No other plans are imminent for county park facility construction, expansion, or acquisition, except within the proposed Wainee Village public housing site being considered for dedication by its owner, Amfac. The County Department of Parks and Recreation plans to add more park maintenance workers and recreation supervisors to their West Maui staff in the upcoming fiscal year.

Three state beach parks are also located in West Maui, Launiupoko, Wahikuli, and Papalaua. No further park land acquisition is currently being considered, although the Division of State Parks would like to obtain additional funding to develop the state park land between Wahikuli and the adjacent shoreline sewage pump station so that the vicinity can be properly maintained by parks staff. Three state parks maintenance staff positions are assigned to West Maui, a number sufficient to handle current and expected future parks maintenance needs. At present, only one full-time staff member works on West Maui with occasional assistance from staff in Central Maui.

Section III
RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS

A. STATE LAND USE PLAN

The State Land Use Commission is the highest regulatory authority on land use in the State of Hawaii. It is a quasi-judicial, appointed body charged by Chapter 205, Hawaii Revised Statutes with approving the redesignation of property among the four state land use districts: conservation, agricultural, rural, and urban. All zoning and land uses granted by county governments to individual properties must conform to the densities and uses permitted in the state land use districts within which the properties lie. Consequently, while any urban uses (i.e., residential, commercial, industrial, resort, etc.) are permitted in the urban land use district, only agricultural pursuits, agricultural housing densities, and specified corollary uses are permitted in the agricultural land use district. Comparable restrictions also govern uses and densities in the rural and conservation land use districts.

Should a property owner desire to use land for a use other than those permitted in the governing state land use district, the landowner must either petition the Land Use Commission to change the property to another, more appropriate, land use district or request a special use permit to allow the use. If a special use permit is requested for a parcel less than 15 acres in size, then the County Planning Commission is the ruling authority; otherwise, the Land Use Commission must approve the Planning Commission's decision.

The proposed facility expansion site lies within the agricultural land use district. Wastewater treatment is not a permitted use in this district. Consequently, a special use permit has been received from the County of Maui Planning Commission for this 8-acre site.

B. HAWAII STATE PLAN

Development of the proposed treatment facility expansion is generally consistent with the policies and objectives of the Hawaii State Plan, which was approved by the 1978 State Legislature under Chapter 226, Hawaii Revised Statutes. The facility expansion allows for the infrastructure needed to accommodate existing and future residential, commercial, and resort uses, and it ensures proper treatment of wastewater generated by those uses. Thus, it fulfills state plan objectives to remove pollution threats to valuable coastal and groundwater resources and to provide alternative, recycled sources of water and fertilizer usable within the agricultural industry.

Approximately one-third of the facility's capacity will provide support for further resort growth at Kaanapali, an area long designated by the state plan as a primary tourist destination area. Such growth is typically accompanied by local increases in supportive service businesses. Together, the resort and supporting service industries will help provide the increased and diversified employment opportunities sought by the state plan "...to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people" (Section 6 of Hawaii State Plan).

C. HAWAII STATE FUNCTIONAL PLANS

The State Functional Plans are a series of 12 documents formulated as supplements to the Hawaii State Plan. They serve as management and coordination guides for statewide functional area activities. They address Hawaii's needs, problems, and issues; and recommend policies and actions to mitigate problems and bring about desirable conditions. The State Functional Plans consequently assist the County General Plans in implementing the goals, objectives, policies, and priority directions laid out in the Hawaii State Plan.

1. State Tourism Plan

The proposed expansion of the Lahaina wastewater treatment plant directly furthers the several applicable State Tourism Plan policies. It will sustain and possibly improve the quality of the West Maui visitor destination area by eliminating the need for the numerous private treatment facilities. These facilities have been hazardous to coastal water quality since they dispose primary treated effluent through subsurface injection. The proposed facility is an example of public and private sector cooperation in infrastructure improvements necessary not only for tourism development but for residential growth as well. It indirectly assists in ensuring steady employment for Maui's people by providing infrastructure that is critical to the continued safe operation of resort and condominium developments and resident commercial enterprises throughout West Maui.

The proposed facility also reinforces specific Priority Directions. It will protect the economic health and quality of the visitor industry by providing centralized, high quality wastewater treatment that will enable closure of the many pollution-prone private treatment systems. Facilitating such closures will serve to preserve and enhance West Maui's coastal waters and beaches, both of which are significant natural and scenic sites.

The proposed facility strongly supports the State Tourism Plan objective that states: "Development and maintenance of a well-designed and adequately serviced visitor industry and

related developments in keeping with the needs and aspirations of Hawaii's people." It directly furthers certain implementing actions under the policy to "Encourage greater cooperation between the public and private sectors in developing and maintaining well-designed and adequately serviced visitor industry and related developments." Amfac is assuming the financial responsibility to ensure that this infrastructure component is provided in West Maui, for both resort and municipal use. The facility will provide capital improvements that support private development in a designated visitor destination area, and constitutes a regional system that centralizes all wastewater treatment in keeping with state policy.

2. State Agricultural Plan

The State Agricultural Plan (October 1982) sets forth the policies, programs, and projects for implementing the agricultural and agriculture-related objectives, policies, and priority directions contained in the Hawaii State Plan. Expanding the Lahaina wastewater treatment plant partially conflicts with that State Agriculture Plan objective of "Achievement of productive agricultural use of lands most suitable and needed for agriculture" and specifically the policy to "Provide greater protection to agricultural lands in accordance with the Hawaii State Constitution." The facility expansion would remove from active cane production 8 acres of prime agricultural land. The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes) contains objectives relating to the increased viability of the sugar and pineapple industries and the continued growth and development of diversified agriculture (Section 226-7, HRS). Correspondingly, it is the policy of the State of Hawaii to "Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs" [Section 226-7(b)(6)]. The Priority Directions, which provide immediate focus for public and private actions to address major statewide problems, encourage "...urban growth away from areas where other important benefits are present, such as protection of valuable agricultural land..." [Section 226-104(c)(2)] and seek "...to accommodate urban growth in existing urban areas while maintaining agricultural lands in agricultural designations" [Section 226-105(c)].

The proposed action will partially conflict with the above-cited state plan. However, as noted under Action B(5)(c) of the State Agricultural Plan, overriding public interests exist that warrant the withdrawal, namely, the critical need for additional wastewater treatment capacity by the adjacent County-built treatment facility. Without provision of such additional capacity at the suggested location, existing uses would be forced to continue disposing wastewater through individual systems, while community and resort growth within West Maui's existing urban area would be severely inhibited.

Design efforts for the proposed facility expansion directly furthered the plan's objective of "Achievement of efficient and equitable provision of adequate water for agricultural use" as well as the policy to "Expand agricultural water resources statewide." The appropriate implementing action to "Monitor, evaluate and increase efforts to use treated effluent for agricultural irrigation" was undertaken with extensive analysis of effluent reuse for irrigation by PMCo. While determined technically and logistically feasible, it is not currently economic for PMCo. due to an existing supply of less expensive water. Project designers have recommended that the possibility for effluent reuse be periodically re-evaluated to determine whether the economics have changed sufficiently to warrant the use of effluent in sugarcane irrigation.

D. STATE ENVIRONMENTAL POLICY AND GUIDELINES

The proposed action will enable the County of Maui to further the environmental policies and guidelines adopted by the State Legislature (Chapter 344, Hawaii Revised Statutes). Construction of the proposed treatment facility allows the County to control water pollution resulting from the widespread use of individual cesspools and private primary treatment plants throughout West Maui. Furthermore, the district's increasingly limited water resources will be augmented either by reusing the effluent for irrigation or by groundwater recharge from subsurface effluent injection. In particular, effluent reuse would conserve water resources by reducing PMCo.'s need to withdraw additional groundwater for field irrigation.

E. STATE ENVIRONMENTAL QUALITY CONTROLS

The proposed treatment facility expansion directly conforms to those state regulations (Chapter 342, Hawaii Revised Statutes) that control potential sources of air, water, noise, and solid waste pollution. Design measures will minimize the possibility of odor-caused air pollution by covering those treatment units capable of releasing noxious odors and scrubbing these units' internal air. The facility is also designed to produce a high quality effluent that exceeds the minimum state health standards. This effluent may be safely reused for irrigation and disposed into the subsurface groundwater without threat of water pollution or contamination. Means to reuse the sludge as fertilizer within PMCo.'s plantation have been investigated. Such reuse is encouraged by the DOH so that this potentially valuable resource is recycled rather than simply disposed of as permitted in the County's sanitary landfill at Olowalu. The last form of pollution regulated under this statute is noise pollution, which will not occur at the proposed facility expansion due to the low ambient noise levels of the equipment and operation procedures.

F. COUNTY OF MAUI GENERAL PLAN

The County of Maui Comprehensive General Plan was adopted by the County Council on June 9, 1980. It sets forth the County's overall long-range development policies and patterns. It also establishes social, environmental, and economic policies that will maintain the general welfare and prosperity of County residents.

The proposed facility expansion directly complies with the General Plan policy of "Protecting the quality of the County's environment by ...minimizing all types of pollution and hazards." The proposed project will increase the capacity of the County's already strained treatment facility with a new system designed to thoroughly treat municipal and resort wastewater. Additionally, if effluent can be used by Pioneer Mill for irrigation purposes, the proposed facility expansion would further the General Plan policy to "Encourage and develop programs for the reuse of solid and liquid waste material."

G. LAHAINA GENERAL PLAN AND PROPOSED LAHAINA COMMUNITY PLAN

The Lahaina General Plan was created in 1968 to guide long range development in the Lahaina District and to ensure that development will neither despoil nor detract from the area's natural and aesthetic resources. The plan contains overall policy guidelines that indicate desirable trends and patterns to be followed in future district land uses.

The proposed facility expansion site is designated by the Lahaina General Plan for apartment uses. It is bordered by the same to the north, south, and east and by an open zone to the west, up to Honoapiilani Highway. Lands immediately across the highway are designed and zoned for hotel use.

The proposed facility expansion is not a permitted use on commercially designated lands. However, the proposed Lahaina Community Plan, which upon County Council approval will supersede the current Lahaina General Plan, designates the site for public/quasi-public uses, which include wastewater treatment facilities. The proposed plan is expected to be enacted long before completion of the proposed facility expansion. Therefore, the expansion will conform to the general plan designation.

H. COUNTY OF MAUI 208 WATER QUALITY MANAGEMENT PLAN

The County of Maui 208 Water Quality Management Plan, adopted in October 1978, seeks to pinpoint probable environmental, economic, and social effects stemming from agency actions to control major water quality problems. Approaches to solving these problems are recommended, as well as general measures to mitigate negative environmental effects.

The proposed facility expansion fulfills the intent of the plan by removing any current or future threat of groundwater pollution caused by overextending the capacity of the existing treatment facility. The proposed expansion will provide wastewater treatment with effluent quality standards higher than those typically attained by the County's municipal systems and could improve the quality of water used by PMCo. by increasing the water supply while decreasing its salinity.

I. COUNTY OF MAUI ZONING

Current County of Maui zoning for the project site conforms to the provisions of the state agricultural land use district. Thus, the County has zoned the site for agricultural uses. Wastewater treatment is not a permitted use in agricultural zones, so the proposed facility expansion will not conform to its local zoning upon receipt of the recently approved special use permit. Such a conformance is not required according to the state and County guidelines for special use permits, however. Future urban redistricting for the site has been made a condition under the special use permit recently issued by the Maui County Planning Commission. Once redistricting occurs it will be necessary to rezone the site to an appropriate urban industrial zone.

J. FEDERAL CLEAN WATER ACT

The Federal Clean Water Act of 1977, as amended, seeks to restore and maintain the chemical, physical, and biological integrity of the nation's surface, ground and coastal waters. It establishes water quality standards, implementation and enforcement plans, permit procedures, and grant programs for pollution research and wastewater treatment facility construction.

Since wastewater treated in the facility expansion will perpetually receive high quality treatment, the possible practices of recycling effluent and sludge for irrigation and fertilizer by PMCo. will not harm the quality of groundwater resources. By decreasing the concentrations of organic pollutants that otherwise might percolate to the groundwater basal lens through irrigation practices, the proposed facility expansion would thus be consistent with the Clean Water Act's purposes and guidelines.

Section IV
PROBABLE ENVIRONMENTAL IMPACTS

The probable environmental impacts of the proposed facility expansion will be addressed in several different yet interdependent ways. The basic analysis is in terms of positive versus negative impacts. However, short-term versus long-term impacts, primary versus secondary impacts, and impacts from both the construction and operation phases are also considered.

A. NATURAL RESOURCES

Constructing the proposed facility expansion will not eliminate any naturally occurring ecosystems, since the site has long been cultivated in sugarcane. Populations of rodents, birds, and mongooses normally living in the cane fields will relocate. These mammals are widespread throughout Maui and are not usually regarded as beneficial. No negative short-term or long-term impacts will result from removing such a small portion of their habitat.

B. AGRICULTURAL RESOURCES

The PMCo. staff has prepared cultivated acreage projections for the period 1981 through 1993, and has identified annual acreage reductions due to expected withdrawals of leased lands, community urbanization, and resort development. These acreage reductions vary considerably from year to year, but add up to a total reduction of 982 acres between 1982 and 1993. Annual acreage reductions during this period range from 0.4 percent to 3.4 percent of total cultivated acreage.

Constructing the proposed facility expansion will remove approximately 8 acres of cane land from cultivation. A secondary impact could be the further reduction of 65 acres by 1990 if Amfac decides to use its remaining 1.16 mgd of treatment capacity to support resort expansion onto its urban districted and zoned North Beach lands. This potential total crop area reduction by Amfac of 73 acres through the end of this decade represents less than one percent of the 7,514 acres projected by PMCo. staff for cultivation in 1990.

The North Beach lands, while not presently planted in cane, have been cultivated in the recent past. These lands have good quality soils, yet production yields have not been as high as for fields further mauka due to their proximity to the ocean and salt-laden breezes. Salt breezes and, more particularly, saline irrigation water tend to inhibit sugar production during the latter stages of cane maturation.

If Amfac chose to add further treatment capacity (Phase III expansion) to service a resort and mauka residential community

fully developed as described in the proposed Lahaina Community Plan, approximately 320 acres (including the facility expansion site and North Beach) could be removed from cane production over the next 20 to 30 years. This potential acreage reduction is included in the total 982 acres identified by PMCo. staff for production withdrawal between 1982 and 1993. The 320 acres is equivalent to approximately 4 percent of the total 8,083 acres cultivated in 1982 and approximately 4.3 percent of the 7,377 acres to be cultivated in 1993.

The PMCo. staff indicates that acreage reductions from the planned community and resort development will not significantly or negatively impact plantation productivity and profitability as projected for the period ending in 1993. While there will be cultivated acreage reductions from these causes as well as from lease withdrawals by Maui Land and Pineapple Company, the staff is confident that income losses from decreased cane tonnage will be offset by considerable reductions in irrigation water pumping costs resulting from the extensive substitution of drip for furrow irrigation systems.

The cultivated lands in Kaanapali mauka of the Honoapiilani Highway and makai of the Puukolii Village are considered by the PMCo. staff to be good quality cane land. They are ranked below the plantation's presently most productive lands mauka of Wahikuli and the mill, primarily because of the high salinity of the well water used to irrigate the Kaanapali fields. Their productivity consequently tends to be erratic, rising and falling with the quantity of rainwater available to dilute the increasingly saline basal lens water withdrawn for irrigation in this area.

Other agricultural lands identified by the proposed Lahaina Community Plan for likely urbanization by the year 2000 are located mauka of the Napilihau community; mauka of Kapalua; infill between Napili-Kapalua and the proposed extension of Honoapiilani Highway; mauka of the Wahikuli residential and Limahana industrial areas; mauka and north of Kelawea Mauka residential area; and at Launiupoko, Olowalu, and Ukumehame. Urbanization of these areas is predicted as necessary by the plan to support expected district residential, commercial and industrial needs.

Potential future losses of agricultural lands were considered during preparation of both the Lahaina General Plan and the proposed Lahaina Community Plan. Both plans acknowledge the need for further expansion of residential and resort lands to accommodate expected resident and tourist population increases. However, since West Maui's urban lands are finite in extent and since cane land must be used to accommodate the bulk of these population increases, it became a question

as to which cane lands could be urbanized with the least harm to PMCo.'s operations. Agricultural loss in the Kaanapali area is rated less detrimental than the loss of other, more productive, lands closer to the mill. Therefore, Kaanapali is designated to help absorb the near-term future growth anticipated by both plans. The proposed Phase II facility expansion will accommodate existing and committed development through 1985 and will thus assist in implementing the community plans. It will not, in and of itself, initiate growth.

C. PUBLIC HEALTH

Treatment of resort and municipal wastewater in the proposed facility expansion will have both immediate and long-term positive public health benefits. The modern facility will allow close regulation of the quality of effluent. This control will ensure that there is no human exposure to wastewater, which, when ineffectively treated, is potentially a transmitter of viruses and disease.

Effluent disposed of in injection wells or recycled for irrigation will minimize any potential impact on the quality of groundwater resources, since effluent produced by this treatment process will be clean and of higher quality than required by the DOH. The ability to recycle effluent safely represents a secondary, long-term, positive impact of the proposed facility expansion.

The upcoming 2.0-mgd Napili-Honokowai wastewater collection system can also be hooked up for treatment following completion of the proposed facility expansion. Any delay would indefinitely prolong use of septic systems and other private treatment systems in the communities of Honokowai, Kahana, and Napili. Use of private treatment systems in these communities threatens public health because of the localized high rate (31 percent) of septic tank/cesspool failure. The failures result from systems that are located in nonporous, clayey soils that become clogged by bacterial growth and fine solids. System overflows commonly result, and create both health and nuisance problems. The proposed facility expansion will enable closure of these private disposal systems and will have a long-term and substantial positive impact on public health.

D. WATER RESOURCES

The natural salinity of water withdrawn from some of PMCo.'s coastal wells has increased during the last decade to levels debilitating to sugarcane production. If the plantation's irrigation water can be diluted with effluent from the proposed facility expansion, its high salinity content can be significantly reduced. Thus, the expected quality and volume of sugar produced can be maintained.

Proposed dilution practices would positively impact West Maui's water resources in both the short and long term for two major reasons. First, there would be less need to drill additional wells to meet anticipated increases in water demand and to obtain water with adequate salinity levels. This is important since potable water resources may become increasingly limited in Lahaina District should future water withdrawals exceed the rate of recharge. The State Department of Land and Natural Resources, Division of Water and Land Development, has considered designating West Maui as a groundwater control area in order to strictly regulate the rate of water withdrawals. The second positive impact is that the resulting higher quality irrigation waters would percolate to and recharge the basal lens with water of lower salinity than that originally withdrawn.

The proposed action will have no impact on Honokowai Stream or shoreline, and will not affect the stream's function as a natural channel for area runoff. Construction and operation of the facility expansion will not affect Honokowai Stream or shoreline. Most of the project site is in excess of 1,000 feet from the stream. No structures or pipes will be constructed adjacent to or connected to the stream. All effluent will be disposed of on-site in four injection wells, or pumped to the existing County reservoir for distribution to PMCo. ditches and cane fields for irrigation.

Standby power is provided, along with multiple structures and equipment, to provide process reliability and backup. Gravity overflow is provided to the injection wells, further minimizing any chance for the effluent to impact offsite areas.

E. LAND USE

The proposed treatment facility expansion is consistent with local land use plans and will provide the necessary wastewater treatment capacity to accommodate projected growth. The proposed Lahaina Community Plan allows future resort and residential development in selected areas of the Lahaina District. The proposed action will provide needed public facilities to support that planned growth.

As described in Section I, approximately 5.17 mgd of the expected total 6.7 mgd of available treatment capacity will accommodate existing land uses and committed developments through 1985, while about 1.53 mgd (or one-third of the expansion capacity) will be available to support additional growth. Some 1.16 mgd of this capacity will be owned by Amfac and 0.37 mgd by the County.

Possible uses of the County's extra capacity include hookup of additional homes, commercial businesses, or hotel facili-

the visitor industry. Higher property and excise tax revenues result from heightened activity throughout this financial network, and consequently benefit the community through increased public services and expanded public infrastructure.

Substantially expanded employment opportunities stemming from further resort and commercial development will also constitute positive short- and long-term secondary economic impacts of the proposed facility expansion. These opportunities will occur first through direct service within an expanded resort complex and with new commercial enterprises, and secondarily through those area merchants and enterprises that expand their staff, inventory, and overall capability to serve an increased population. Further development of the tourism industry is identified as one of several positive means of economic stabilization and employment provision in West Maui by both the proposed Lahaina Community Plan and the Lahaina General Plan.

H. ARCHAEOLOGICAL RESOURCES

No archaeological resources have been identified on the proposed project site. The site has long been used for sugarcane production, which would lessen the likelihood of the presence of cultural or archaeological resources. However, should such features be discovered during site preparation and construction, the State Historic Sites Office will be contacted immediately and work affecting those features will halt until appropriate safeguards have been implemented.

I. ENERGY RESOURCES

Wastewater treatment systems are highly energy consumptive. Consequently, the proposed facility expansion may cause both short-term and long-term negative impacts on local energy use. Although the proposed facility expansion will be an intensive energy user, this use is justified for three principal reasons. First, it will provide treatment capacity critically needed by the County and otherwise unavailable, through the mid to latter part of this decade. Second, additional resort and municipal growth is unable to proceed without this facility expansion. This growth is the key to increasing the economic health and vitality of this region. And last, the small private wastewater plants currently operating in the Napili-Honokowai area are high energy consumers. This energy use will decrease significantly when hookup to the expanded facility occurs.

J. DRAINAGE

Constructing the proposed facility expansion will neither positively nor negatively impact area drainage patterns in either the short or long term. Because of the proposed

couraged and feel unable to control or influence their region's development. There is also fear, whether warranted or not, that visitor facilities have previously been developed in excess of need; that plans for further increasing the visitor accommodation inventory risk overbuilding this industry, with serious potential for local economic repercussions should the predicted visitor influx fail.

Other long-term secondary impacts and concerns that could be classified as socially negative include the stimulation of continued urbanization that residents may perceive as overcrowding; lack of access to shorelines; loss of open space and vistas; further disruption of community structure by an influx of newcomers often having little in common with long-time area residents; and potential loss of familiar long-time area businesses caused by difficulty in competing with new, often more attractive and aggressive businesses.

Conversely, other residents might consider the results of further visitor facility, residential, and commercial growth as socially positive secondary impacts of the proposed facility expansion. Increases in employment opportunities will tend to reduce both out-migration for jobs and reliance on public assistance benefits, both of which are socially disruptive factors that can affect family stability. Increases in housing and commercial facilities could improve West Mauians' sense of self-sufficiency, while reducing overcrowded housing conditions and creating comparative and competitive shopping opportunities. Reinvestment of increased commercial and property tax revenues by the municipality for improved public infrastructure and services also contributes to a psychological sense of stability and pride in community.

Resident population growth is considered inevitable in West Maui. The growth would probably occur regardless of whether the facility expansion was implemented or not, and as such the expansion constitutes neither a positive nor negative impact on social resources. The proposed facility expansion will not necessarily maintain or increase the previous rate of resident population growth, since its ability to accommodate further growth is strictly limited due to capacity constraints.

Positive short- and long-term secondary economic impacts will result from the proposed facility expansion. Increased resort and residential development will directly cause economic growth through an increased exchange of goods and services and increased property and excise tax revenues. Multiplier effects occur throughout the community from heightened economic activity, with increased financial income accruing first to purveyors of goods and services to visitors, and secondarily to those resident-reliant businesses supplying goods and services to individuals and enterprises serving

operating small private installations. An economy of scale results when all such wastewater is treated in a single large facility. The economic benefits accrue to users in the form of decreased operation and overhead costs.

A secondary positive long-term economic impact from accommodating existing uses, both at Kaanapali and throughout the Napili-Honokowai area, is the elimination of any future possibilities of existing business closure due to either the unavailability of treatment capacity or the improper or hazardous operation of private treatment plants.

The social and economic impacts from allocation of the remaining treatment capacity are potentially significant and depend on how Maui County and Amfac use their uncommitted capacity (0.37 mgd and 1.16 mgd, respectively). Since neither entity has publicly committed uses for their remaining capacity, the following discussion must necessarily be general. In this analysis, it is assumed that Amfac will use its capacity for expansion of hotel and supportive restaurant/retail facilities, while Maui County will use its capacity for both residential and commercial/light industrial expansion. The described physical expansions and resultant growth would be primary long-term consequences of the proposed facility expansion.

Growth in visitor population could result, based on both statewide and Maui County tourism industry trends. Resident population growth would also likely occur, responding to increases in both housing supply and employment opportunities. Based upon past growth trends and population structure, additional population will tend to be young, and to work in either the hotel-service industry or retail trade industry.

The secondary social impacts of further resident, visitor, and commercial growth are difficult to typify due to the widely divergent opinions on growth held by the local population. There is a common tendency to regard the economic rewards of such growth (i.e., increased local spending and tax revenues) as positive, while simultaneously castigating the social effects, usually expressed as feelings of personal infringement from greater population and building densities, greater competition for public facilities and services, decreased open space, and impatience with visitor behavior patterns.

Many West Maui residents would view the capacity for growth accommodation as a short- and long-term secondary negative social impact of the proposed facility expansion. Some believe that past visitor industry and residential growth in West Maui has occurred too rapidly and with too little aesthetic consideration and control. Some residents are dis-

All the previously described public service departments (see discussion in II.L) are aware that growth and development in the Lahaina District are expected to continue, and that without appropriate and timely expansion, their abilities to provide adequate service will be compromised. The police, fire, education, health facility, and parks departments are either seeking or planning to seek funding to expand their facilities and/or staffs to meet increased service demands. It is expected that increases in departmental funding will come slowly due to the present Federal, state, and county budgetary restrictions. Maui County expects that by the time the growth supported by the proposed facility expansion occurs, current efforts to obtain funding will have resulted in expanded public services.

The County of Maui, resort developers, affected public agencies, and private associations participated in developing the proposed Lahaina Community Plan. Infrastructure and public service needs to accommodate the projected growth were considered and are outlined in the plan. Constructing the proposed facility expansion is not expected to adversely impact infrastructure, public facilities, and services due to project timing, occurrence of resultant growth in the latter part of this decade, and plans of affected public agencies for appropriate facility and staff expansion.

G. ECONOMIC AND SOCIAL RESOURCES

Impacts of the proposed facility expansion on West Maui's social and economic resources are of two types: impacts from accommodation of existing uses, and impacts of future growth resulting from currently unused treatment capacity. Primary positive short- and long-term social impacts will result from accommodating existing uses. Area residents will receive satisfaction from knowing that the municipality's infrastructure has been expanded to efficiently and safely process wastewater. Secondary positive impacts will result from eliminating the potential for coastal water degradation, reducing public health hazards from occasional improper operation of private treatment plants, and permitting closure of the numerous private treatment plants. Accommodation of existing wastewater treatment needs will use roughly two-thirds of the proposed capacity expansion.

Short- and long-term primary positive economic impacts will result from accommodating existing uses. Following their connection to the Napili-Honokowai collection system, all the private wastewater treatment plants operated by individual hotels, condominiums, commercial facilities, and household septic systems, can be shut down. While these users must subsequently pay regular municipal sewerage charges, the cumulative cost will be far less than the operation, maintenance, repair, and high energy costs of

2. Water Supply

Accommodation of post-1985 population growth and development by the facility is unlikely to impact municipal water service capabilities. Existing and adequate water supply is available at least through 1990. The proposed facility is expected to accommodate future growth to that time. The Department of Water Supply is aware that further water sources must eventually be developed to meet long-term demand. Private water development and delivery systems can also be expanded as needed to meet changing resort water demand.

3. Electricity

No impacts to electrical service capabilities are expected, from either this new wastewater facility or from the growth it could accommodate.

4. Solid Waste

Refuse disposal capabilities at the Olowalu sanitary landfill could be exceeded in the mid-1980s, if the refuse-to-energy plant is not operating and the West Maui landfill is not relocated. In that case, further population and commercial growth occurring after the proposed facility expansion is on-line in 1985 would likely worsen the disposal and sanitation problems at Olowalu. However, the Department of Public Works is currently reviewing alternative solutions.

5. Transportation

Further growth would generate increased traffic and congestion on West Maui's roads, particularly during peak-hour periods. DOT is currently studying possible measures to alleviate current and future congestion between Lahaina town and Kaanapali. It is expected that the chosen measure(s) will be implemented before the proposed facility expansion comes on-line in early 1985. While future growth will increase the actual volume of traffic, improved roadway and highway conditions will reduce the apparent impact on existing traffic levels. If measures to relieve congestion are not implemented before the described growth occurs, then short- and long-term negative impacts on traffic conditions would result.

6. Public Services

If future provision of public services is not coordinated with the growth projected by the proposed Lahaina Community Plan, then future service levels would be negatively impacted. The negative impacts, caused by both community and resort growth accommodated by the facility expansion, would last until the municipality expanded public services to adequate levels.

ties. Generally, a home will generate approximately 350 gallons of wastewater per day, a commercial business will generate approximately 6,000 gallons per day, and a single hotel unit will generate 300 gallons per day. Amfac may opt to develop its North Beach property, with one possible scenario being 2,100 units generating 0.73 mgd. The remainder of Amfac's capacity might support commercial use at North Beach as well as infill within the resort.

The primary long-term impacts of further residential and resort growth in the Lahaina District are increases in both resident and tourist population. If Amfac uses its uncommitted 1.16 mgd capacity to support hotel units, approximately 3,800 units or 7,700 additional tourists could be accommodated. Growth in resident population will depend on the mix of new homes, businesses and hotel units to be accommodated by the County's additional capacity.

The secondary and cumulative long-term impacts of such population growth include increases in all of the following: urbanized areas, traffic volume and congestion, employment opportunities, property and excise tax revenues, shoreline recreational usage, energy usage, and demand for private and public goods and services. Additional infrastructure such as roads, water, and utilities would also be needed.

The main force causing such secondary impacts in this phase of facility expansion would be further resort development. Unless resort development is phased to proceed in tandem with expansion of both private and municipal services and facilities, the short- and long-term impacts on such services and facilities could be negative. Both past and recently completed community planning processes considered the potential impacts of further resort growth, and, by designating future resort uses, indicated that possible secondary impacts are manageable. County plans indicate that the benefits of future resort development are considered to outweigh the described secondary effects.

F. INFRASTRUCTURE AND PUBLIC SERVICES

1. Wastewater Treatment

The proposed treatment facility expansion is a necessary element and planned phase in providing long-term wastewater treatment for the Lahaina District. Constructing the facility expansion will have primary short- and long-term positive impacts on infrastructure development in Maui County, by allowing long-planned efforts to come to fruition. Existing uses cannot be safely serviced, and further development would be severely limited unless needed public facilities are provided.

expansion site's small size (0.4 percent) relative to the total area of the Kaanapali North Gulch watershed, the project's location within the watershed, and planned mitigation measures, construction of the expanded facility is not expected to increase the peak discharge value. It will not adversely affect adjacent or downstream properties, and will not compound the drainage problems that currently plague the downstream properties.

K. AIR, NOISE, AND VISUAL RESOURCES

The proposed expansion will not have a primary effect on future air and noise quality resources within the project area. Short-term construction impacts are discussed in the following sections.

Future development that would be accommodated by the proposed facility is consistent with the proposed Lahaina Community Plan. The maintenance of a high quality living and recreation environment is an important objective of that plan. Thus, actions that implement the proposed plan, such as the proposed facility expansion, will not have negative long-term impacts on the district's environment.

Landscaping will occur around the proposed facility expansion. The existing County facility will also be landscaped. Thus, the visual quality of the area will be enhanced by providing adequate visual buffers between Honoapiilani Highway and the existing facility. One of the long-term negative impacts of the County treatment facility has been its unlandscaped appearance in a visually prominent location along the highway. Amfac will construct an attractive, low-maintenance planting buffer strip along the highway frontage of both the existing facility and the proposed expansion. This will substantially improve the appearance of the existing facility, provide an attractive view of the proposed expansion, and thereby positively impact the existing facility and surrounding area. This landscaping will be maintained by the County.

No noticeable odors or noise levels are expected outside the treatment facility area, due to the planned enclosure of several treatment units, and installation of air scrubbers. These measures will positively impact the area by eliminating previous nuisance problems.

L. CONSTRUCTION ACTIVITIES

Several short-term negative impacts could result from construction activities during the 18-month construction period. During site preparation, grading could increase dust levels and erosion. These impacts can be mitigated, however. Noise and equipment emission levels should rise during the 18 months of site preparation and construction. However,

emissions should not noticeably impact ambient air quality. Higher noise levels will be the most significant short-term negative impact caused by construction activities. The nearest neighbor is a group of Honokowai condominiums approximately 1,200 feet makai of the proposed construction site.

Area traffic patterns should not be noticeably affected during either construction or operation phases. Construction vehicles hauling materials to the site will use the highways during off-peak traffic periods whenever possible.

M. PHASE III FACILITY EXPANSION

The 6.7-mgd expanded treatment facility is projected to operate at capacity by 1990. The County will likely attain its 3.54-mgd capacity shortly after the proposed facility expansion comes on-line, while Amfac's 3.16-mgd capacity should last until 1991 if resort growth continues at the projected even pace. The need for a Phase III facility expansion, tentatively sized at 3.5 mgd, is currently being assessed by the County. It would appear that Phase III will be necessary if further community growth occurs, as outlined by the proposed Lahaina Community Plan. Without Phase III, further community growth would rely on cesspools and private treatment plants for wastewater disposal, a situation similar to that presently occurring in the Napili-Honokowai area.

The County of Maui has not determined how the capacity from a Phase III expansion would be allocated. Nor has Amfac outlined its plans for future resort expansion onto its mauka lands, which would require additional wastewater treatment capacity. If development in the next 8 to 10 years occurred as outlined in the proposed Lahaina Community Plan, residential infill between Lahaina and Napili, and residential development at Napilihau Mauka, Kapunakea, Wainee Village, Crater Reservoir and Kaanapali North could be expected. It is doubtful, however, that more than one-quarter to one-third of the Phase III capacity would be absorbed by residents of the infill and newly developed areas. Consequently, it seems likely that further commercial and light industrial development, targeted by the plan as essential to diversify the economic base, would occur in West Maui.

The absence of definitive future development scenarios in West Maui makes it difficult to identify specific potential secondary impacts from a Phase III expansion. In general terms, potential secondary impacts are likely to include increases in population, urbanized lands, economic diversity, employment opportunities, property and excise tax revenues, utility usage, demand for infrastructure and public services, private goods and services, shoreline and recreational area usage, traffic volume and congestion, and further withdrawal of agricultural lands for urban expansion.

Section V
UNAVOIDABLE ADVERSE IMPACTS

A. IMPACTS

The proposed facility expansion's most significant long-term impact is its ability to accommodate limited further development in the Lahaina District. Additional resort and residential/commercial development would increase pressures on the infrastructure capacity in West Maui. Urbanization, traffic volumes, and energy use would increase; recreational areas would be more heavily used; and the demand for both private and municipal services would rise. Selected agricultural lands would be converted to urban uses. Impacts on infrastructure, facilities, and services would be unavoidably negative unless their expansion coincided with further resort and community development.

Unavoidable adverse social impacts may possibly be caused by the growth accommodated by the proposed facility expansion. Some West Maui residents are antagonistic to further growth, and believe that the marked transformation of land use densities and patterns, social and business structure, historical lifestyles, and community and family relationships, already initiated by two decades of rapid residential and visitor industry growth will continue, and are an inevitable consequence of the proposed facility expansion. Not all members of the community will hold such opinions, but those most likely to will be the long-time residents and their families.

During construction, both dust and noise levels will increase along with possible occasional road congestion from trucks and other heavy equipment. These short-term impacts can be mitigated.

B. REASONS FOR PROCEEDING

After evaluating all impacts likely to result from the proposed facility expansion, the County and Amfac decided to proceed with the project. The potential impacts were all considered during development of both the Lahaina General Plan and the proposed Lahaina Community Plan. It was determined that further residential and business growth in the district was appropriate, that the Kaanapali area was suitable for further resort development, and that identified impacts could be managed without overriding stress to the community.

Furthermore, the benefits of ensuring long-term thorough treatment of large volumes of wastewater; protection of public health and water resources; achievement of compliance with state and Federal effluent quality requirements; and

improvement of West Maui's social and economic diversity and well-being by allowing further residential, commercial, and resort growth to continue, clearly outweigh the disadvantages that could possibly result from the proposed facility expansion.

Section VI
ALTERNATIVES TO THE PROPOSED ACTION

Four alternatives to the proposed facility expansion were considered. They are:

A. Expand Existing County Facility

B. Construct a Private Facility for Kaanapali Wastewater

C. Increase Capacity of Proposed Facility Expansion

D. No Action or Postponing Action

A. EXPAND EXISTING COUNTY FACILITY

The County and Amfac could have satisfied their wastewater treatment needs by increasing the capacity at the existing wastewater treatment facility, rather than constructing a new and entirely self-contained adjacent treatment facility. However, the County treatment facility was designed 10 years ago. Rapid technological advances have resulted in the availability of more efficient, reliable, and cost-effective treatment systems. Overlay of an updated expansion over the existing facility would cost far more than building a new separate facility, due to necessary remodeling and replacement of existing structures. In addition, public systems take longer to build and generally are bid higher than privately funded works. These factors, coupled with inflation rates accrued over a longer construction period, could result in construction costs 40 to 50 percent higher than for a completely new system.

Impacts associated with the expansion of the existing County facility would be very similar to those resulting from the proposed action. Expansion would probably occur on the same parcel of land, necessitating its removal from cane production. Construction impacts would be similar since they would affect the same area. Secondary impacts would also be similar since expansion of the existing facility would increase wastewater capacity to the same level as the proposed action.

B. CONSTRUCT A PRIVATE FACILITY FOR KAANAPALI WASTEWATER

Amfac could fund an entirely private, self-contained wastewater treatment facility to satisfy Kaanapali's wastewater demand and subsequently operate that facility as a private utility in perpetuity. Amfac would thus completely control the rate of increase, as well as quality, of wastewater treatment, and could more easily reuse the effluent for irrigation purposes within the resort or the PMCo. plantation.

The County would be relieved of increased operation and maintenance and energy costs.

A private treatment system could be created either by constructing an entirely new wastewater treatment facility on resort land that is sized to treat Kaanapali's ultimate wastewater demand, or by renovating and expanding Kaanapali's inactive package treatment plant. The former option would be more effective, since renovating and expanding the resort's inactive package treatment plant to treat Kaanapali's wastewater is economically infeasible. The package plant's equipment is obsolete and incapable of meeting new stringent effluent quality requirements. It is partially inoperable due to long deferred maintenance and falls far short of the capacity needed to treat current volumes of resort wastewater. Altering the facility to expand its capacity and to bring it into compliance with current and anticipated future DOH standards would be nearly equivalent in cost to constructing a new modern facility.

Several alternative private wastewater treatment facility sites were considered on Amfac-owned lands mauka of Honoapiilani Highway, with the most likely site being just makai of Puukolii Village. Despite the physical and construction related advantages of this site and the ease with which effluent could be recycled within the resort and plantation, building a treatment facility here would require private operation indefinitely, if not permanently. This would keep Amfac perpetually in the wastewater utility business, a position from which the company wishes to withdraw, both of its own volition and in compliance with state policy. DOH also prefers that all wastewater treatment operations be undertaken by the local municipality to facilitate and ensure full quality control. The Puukolii and other alternative sites are also regarded by PMCo. as high production cane land and essential to further agricultural production.

Furthermore, unless Amfac built a new wastewater treatment facility adjacent to the County site and dedicated it thereafter, the County could not obtain the 1.0 mgd of permanent capacity and the available temporary capacity urgently needed to satisfy its own municipal treatment commitments.

Impacts of this alternative would depend upon the specific site chosen for construction of the new facility. Many of the sites considered are currently in cane production and would result in a loss of that agricultural resource. Construction impacts would be similar, although they would affect a different area within the Lahaina District.

The extent of secondary impacts is difficult to assess. If Amfac limited capacity of the treatment facility to only that needed for resort development, an additional County

facility expansion would be required to accommodate future municipal growth. The timing of such an expansion would have a significant impact on future service levels to Napili-Honokowai and other residential areas.

C. INCREASE CAPACITY OF PROPOSED FACILITY EXPANSION

A larger facility expansion could be built now if the County participated with Amfac in funding construction of additional capacity beyond that presently being provided by Amfac. This would postpone the need for a Phase III expansion. Ultimate system costs consequently could be reduced by taking advantage of current unit and labor prices, the absence of future inflationary costs, and the cost-effectiveness of constructing a single larger facility. However, with the proposed Lahaina Community Plan still pending, the County is reluctant to commit infrastructure support for as yet unapproved population and urbanization growth rates. Such a commitment is unjustified in the absence of an approved district general plan.

Construction of a larger expansion could probably be accomplished on the proposed 8-acre site. Thus, no additional land would be removed from cane production. Although construction would occur over a slightly longer time period, construction impacts would be similar to those projected for the proposed action.

Increasing the size of the facility beyond that provided in the proposed action would increase the amount of future growth that could be accommodated. Secondary, long-term impacts from such an expansion would depend upon the amount of increased capacity to be provided.

D. NO ACTION OR POSTPONING ACTION

To make no effort to ensure proper and timely treatment of municipal and resort wastewater, or to deliberately postpone such action, would guarantee current and future lack of compliance with state and Federal wastewater treatment requirements. Amfac has the responsibility of ensuring that all Kaanapali wastewater is effectively treated, while the County is similarly responsible for ensuring that the federally funded Napili-Honokowai collection system is connected for wastewater treatment in a timely manner. Further, failure to collect wastewater from and provide treatment to the Napili-Honokowai area could result in pollution to the beaches immediately fronting the area.

If no action is taken, future growth consistent with the Lahaina Community Plan could not occur. Health hazards could occur as a result of continued failing septic tanks in the Napili-Honokowai areas and future resort and municipal growth

would be halted. These results are not consistent with Federal, state, or local environmental and land use policy.

Section VII
RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The County of Maui and Amfac are committed to ensuring thorough treatment of wastewater generated by the Kaanapali resort and West Maui communities. Both short-term and long-term environmental gains include eliminating potential hazards to the public's health, safety, and welfare; eliminating any likelihood of groundwater contamination from inadequate wastewater treatment; and providing a significant volume of high quality nonpotable water usable for irrigation purposes. These gains outweigh the short-term losses of disrupted local conditions resulting from construction activities and the long-term effects of planned municipal and resort growth.

Trade-offs would result from the proposed activity. Both short-term and long-term provisions for stable public health and economic growth and diversity would occur at the expense of potential long-term reductions in agricultural resources and possible losses of old-time community relationships, structure, lifestyles, and spatial patterns. The PMCo. staff does not expect reduction in agricultural resources through 1993 to cause loss of revenue, however, because of technological advances in irrigation methods.

The proposed facility expansion forecloses any future options for the project site, at least through the plant's 20-year design life. Construction of the facility, however, will cause no loss of historic, archaeological, or cultural sites; will not disrupt any naturally occurring ecosystems; and will not endanger any unique natural life forms or lifestyles.

Section VIII
MITIGATING MEASURES

A. AGRICULTURAL RESOURCES

The Pioneer Mill staff has indicated that about 350 reserve acres of fallow agricultural land are available to be returned to sugarcane production if so needed. The acreage is considered high quality with good soil, but is not presently cultivated because it is at a high elevation on the mauka perimeter of existing cane fields. These fallow lands would be brought into production in the future if circumstances were causing plantation profitability to fall.

The widespread substitution of drip for furrow irrigation systems throughout the plantation can also be regarded as a mitigation measure to offset expected income losses from decreases in cultivated acreage. PMCo. staff members are expecting substantial energy cost savings from reduction of pump usage to pump irrigation water to the fields and through the furrows. The energy cost savings are expected to offset income losses from decreased cane tonnage.

B. LAND USE AND INFRASTRUCTURE RESOURCES

Additional resort and residential growth assumes a subsequent increase in equivalent population, which in turn would place pressure on area infrastructure, traffic volume, recreational areas, the rate of urbanization, energy usage, and the local capability to provide goods and services. Resort, residential, and commercial developers must be encouraged to coordinate their projects with the appropriate provision of local infrastructure and services. The cost of infrastructure expansion will be borne primarily by area developers. Most infrastructure development will not require the outlay of public funds. However, some future infrastructure construction, such as transportation access, could require public financing.

C. SOCIAL RESOURCES

Some residents will be opposed to the district-wide growth opportunities afforded by the proposed facility expansion, and will view future resort growth as a socially negative impact on West Maui. Such views can be partially mitigated by Amfac ensuring the quality layout of an expanded resort, and by ensuring the continued and convenient access to and use of shoreline recreational resources for the resident population. Both the County and Amfac can offset heightened, growth-caused competition for both private and public services and facilities by timing developments to coincide with expansion of infrastructure, services, and facilities.

D. ENERGY RESOURCES

Wastewater treatment facilities are intensive energy users and as such will increase total energy consumption in West Maui. This negative impact has been partially mitigated by selecting the "Carrousel" oxidation ditch treatment process, a system that requires substantially less power to operate than conventional extended aeration processes like the existing municipal treatment facility. In addition, energy use for private wastewater treatment facilities in Napili-Honokowai will be eliminated.

E. DRAINAGE

To ensure that floodwaters do not negatively impact the proposed facility as well as adjacent and downstream properties, flood-proofing measures will be implemented. Existing grades and storm flow patterns across the proposed facility expansion site will be maintained in their original shape as much as possible. Critical systems and structures such as electrical control equipment and treatment units will be "flood-proofed" by elevating them above the expected 100-year storm floodwater levels. The proposed site improvements and facility construction are not expected to impede the storm flows that naturally cross the site or divert water to other areas. Constructing the facility expansion here will neither impact nor compound drainage problems that currently plague adjacent and downstream properties.

F. CONSTRUCTION ACTIVITIES

Dust and erosion impacts typically caused during construction can be mitigated through several controls. If dust levels become a nuisance, a water sprinkling program will be promptly initiated. When possible, construction activities will also be slowed during severely windy periods. Proper grading and stockpiling methods will reduce loss of soil through erosion. Grading will be scheduled to minimize the length of time soil is left exposed before construction, while exposed surfaces will be covered with mulch or similar material if not immediately worked upon. Revegetation and landscaping will proceed simultaneously with site preparation to reduce erosion potential.

Noise impacts will be mitigated by ensuring that working equipment mufflers are used and by limiting the hours of construction. Increases in noise are temporary, however, lasting only the duration of construction.

G. PHASE III FACILITY EXPANSION

Since definitive plans and development scenarios for use of Phase III capacity are unavailable, it is difficult to

identify specific countermeasures to mitigate the adverse secondary impacts that may be associated with a Phase III facility expansion. Furthermore, because of the differing attitudes towards population and economic growth held by the West Maui citizens and interest groups, the impacts of change related to secondary growth are also difficult to categorize as either "adverse" or "beneficial." Such impacts and mitigating measures would be more accurately and appropriately addressed in the environmental analysis for Phase III, if such an expansion is undertaken.

The most obvious impact likely to be associated with Phase III would be the potential impetus given to further withdrawal of agricultural lands for urban expansion. If reduction in cultivated lands exceeds the rate and amount of acreage projected for withdrawal by the PMCo. staff, an adverse secondary impact on plantation viability would probably result. Such an impact would be difficult to mitigate unless PMCo. opted to recultivate some or all of the 350 acres of fallow cane land being held in reserve against such an eventuality.

Impacts on infrastructure would likely be mitigated by residential, commercial, and/or resort developers installing their own infrastructures and participating with the County in developing larger systems. Furthermore, increased revenues from a broadened residential, commercial, industrial, and resort tax base should cover the costs of any needed increases in public services and facilities.

Increased population growth in West Maui to the levels projected by the proposed Lahaina Community Plan will raise traffic volume and congestion on all district roads, but particularly on Honoapiilani Highway. The State Department of Transportation has not made public any plans to improve this highway to accommodate increased traffic but may need to do so to ensure smooth traffic flow and safety on this overcrowded highway.

Section IX
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

A. LABOR

The proposed facility expansion will take approximately 18 months to construct and will rely on the hiring of local contractor and construction workers. These hirings will not detract from other areas of development productivity in the County of Maui, especially since construction work in general is undergoing a slow period.

B. MATERIALS

The materials and energy that this project requires cannot be recovered. However, the materials and energy needed to construct and operate the system are not likely to detract from their use for other kinds of development on Maui.

C. NATURAL RESOURCES

Development of the facility expansion precludes any other use of the intended site during its 20-year design life. The 8-acre site will be permanently lost to sugarcane production; however, the PMCo. staff does not believe that this loss will significantly affect plantation operations.

D. ARCHAEOLOGICAL RESOURCES

Historical, archaeological, or cultural resources will not be lost by developing the project site. Scenic views from the site are not considered locally important, due to low elevation and long-term lack of use by the public because of sugarcane production.

E. ENVIRONMENTAL ACCIDENTS

The only conceivable environmental accident that could result from operating the facility expansion is equipment failure with possible overflow of raw or treated wastewater onto the site. To minimize that unlikely potential, the design uses only gravity flow throughout the major treatment process, including the injection well. Multiple units with ample freeboard and automatic bypassing, even in the event of power outages or equipment failure, are provided. In addition, standby power for the major treatment processes is provided as a backup measure. Any bypassed wastewater will be more intensively treated in other units so that effluent quality standards are maintained.

Section X
OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENT POLICY THAT OFFSET ADVERSE ENVIRONMENTAL EFFECTS OF PROPOSED ACTION

The proposed facility expansion will ensure that all wastewater originating from both the West Maui communities and the Kaanapali resort receives the highest possible level of treatment. It will also ensure that resulting effluent will be of the quality currently required by State DOH and U.S. Environmental Protection Agency standards. Effluent exceeding such standards could be safely recycled to supplement sugarcane irrigation water, a natural resource that may be in increasingly short supply in the future. Threats of water pollution will be largely eliminated in West Maui with the closure of private cesspools and treatment plants. These three principal benefits directly further County, state, and Federal goals for wastewater treatment, pollution control, and resource recycling.

Any of the alternatives to the proposed facility expansion (except no action) could result in the same potentially adverse impacts of physical accommodation of further resort and community growth and the secondary impacts typically associated with such growth. However, such growth is allowed for and is consistent with the Lahaina District's general plans. Furthermore, the Hawaii State Plan encourages dispersion of the visitor industry outside of Oahu to specified primary visitor destination areas such as Kaanapali. The previously described benefits will be most consistently attained in the chosen alternative, in which a single entity--here, the County of Maui--maintains sole control over wastewater treatment operations centered in a single location in West Maui.

Section XI
ORGANIZATIONS AND PERSONS CONSULTED

- Brock and Associates, Wailuku, Maui
- County of Maui Department of Public Works, Waste Management Division and Land Use and Codes Division
- County of Maui Department of Planning
- State Department of Land and Natural Resources, Division of Land Management, Honolulu and Maui Offices
- State Department of Health, Pollution Technical Review Branch, Honolulu and Maui District Office
- State Department of Transportation, Highways Division, Honolulu and Maui Offices
- State Department of Education, Maui District Office
- Amfac Property Corp., Lahaina, Maui
- Pioneer Mill Company, Lahaina, Maui
- State Department of Land and Natural Resources, Historic Sites Office
- CH2M HILL, Inc., Portland, Oregon
- State Board of Land and Natural Resources
- OMI Inc., Kahului, Maui
- State Department of Agriculture
- Mr. Glenn Nanod, Kaunakakai, Molokai
- U.S. Army Corps of Engineers, Flood Plain Management Section, Honolulu, Hawaii
- County of Maui Planning Commission
- State Land Use Commission
- County of Maui Police Department
- County of Maui Fire Department
- County of Maui Department of Water Supply

- Maui Electric Company
- County of Maui Department of Parks and Recreation
- Maui Memorial Hospital
- State Department of Land and Natural Resources, Division of State Parks

Section XII
LIST OF NECESSARY APPROVALS

Four permit procedures must be completed before the proposed facility expansion can begin operation. The agencies that will oversee these procedures are the State Department of Land and Natural Resources, the State Department of Health, the County of Maui Planning Commission, and the County Department of Public Works.

A. SITE NEGOTIATIONS

The proposed site is currently owned by the State of Hawaii. Since the facility expansion will be dedicated to the County of Maui, the County Department of Public Works requested use of the proposed site from the State Board of Land and Natural Resources, the commission that administers state-owned lands. On March 12, 1982, the Board of Land and Natural Resources formally agreed to "set aside" the site to the County for wastewater treatment use.

The Board of Land and Natural Resources simultaneously granted the Department of Public Works a construction right-of-entry to the site. The Governor issued an executive order in December 1982 that formally set aside the site for County use. This executive order must be approved by the State legislature. Legislative approval must be obtained before site construction work can commence. Approval is expected to occur during the 1983 legislative session.

B. SPECIAL USE PERMIT

The County of Maui and the community have recognized that wastewater treatment is an appropriate and reasonable use of the proposed expansion site by designating it and the adjacent County treatment facility site for public/quasi-public uses in the proposed Lahaina Community Plan. This proposed plan, lacking only the County Council's approval before it becomes Lahaina District's general plan, is the culmination of the community's and County's joint planning efforts to assess and direct long-term growth in the Lahaina District. The proposed Lahaina Community Plan redefines the desired perimeters of the urban area and indicates to County officials which areas (including the proposed facility expansion site) require eventual redistricting for urban uses by the State Land Use Commission.

Since the proposed use conforms to the public/quasi-public designation given by the proposed Lahaina Community Plan, the special use permit is the proper interim land use permit until urban redistricting is granted to the County by the Land Use Commission.

The proposed facility expansion furthers the objectives sought by the State Land Use Law and Regulations, and qualifies for designation as an "unusual and reasonable use" in this district as defined by the following regulatory criteria:

1. It proposes to use agricultural land for a purpose clearly in the best short- and long-term interest of the public health and welfare.

2. It will not adversely affect the surrounding properties.

3. It will not unreasonably burden public agencies with providing additional infrastructural services.

4. Unusual conditions and needs have arisen since the district boundaries and regulations were established.

5. The land upon which the proposed use is sought is unsuited for the uses permitted within the district.

While the proposed site is good cane land and has long been used for this purpose, the PMCo. staff's projections indicate that the planned facility expansion and community and resort development through 1993 will not result in significant negative impacts on plantation productivity and profitability. Since they do not characterize the withdrawal of the proposed site as significantly deleterious to plantation operations, the proposed facility expansion, a use clearly in the public welfare, is further validated as an "unusual and reasonable use" within the agricultural district.

A special use permit for the proposed expansion was issued by the Maui County Planning Commission in December 1982. The proposed facility expansion is scheduled to begin operation in late 1984 or early 1985. It is expected that the proposed use will conform to its land use district at the time of operation based upon the planned urban redistricting. There will be no future need to seek extension of the temporary special use permit.

C. HEALTH PERMITS

Since the proposed facility expansion will be operated and ultimately owned by the County, the County Department of Public Works will submit the construction plans, specifications, and a system description to the State Department of Health for approval. DOH review and approval should be completed in mid-February 1983.

D. SITE WORK AND BUILDING PERMITS

Before site work and construction can begin, the building, grubbing, and grading permits must be issued by the County Department of Public Works. In addition to reviewing the construction plans and specifications, the Department of Public Works will also request submittal of site drainage and erosion control reports. The necessary documents will be submitted for concurrent County and DOH review.

The building and site work permits will most likely be granted simultaneously with the DOH's issuance of construction approval.

E. SUMMARY OF PERMIT PROCEDURES

There are two significant remaining milestones in the permit procedures outlined above. These milestones are critical since delay could upset the project schedule and hamper timely completion of the proposed facility expansion. If timely completion is inhibited, the expansion would not be brought on-line in time to alleviate a potential capacity deficit that could, at worst, mandate issuance of a district-wide building moratorium.

The critical points are: legislative approval of setting aside the facility expansion site for County use and issuance of construction approval by the DOH.

Section XIII
COMMENTS AND RESPONSES DURING CONSULTATION

The Division of Aquatic Resources of the State of Hawaii Department of Land and Natural Resources requested that the environmental impact statement for the proposed expansion project take into account the proximity of Honokowai Stream and shoreline. They requested a discussion of the existing resources of stream and shoreline, potential construction and operational effects, and mitigation measures for any adverse impacts.

The proposed action will have no impact on Honokowai Stream or shoreline, and will not affect its function as a natural channel for area runoff. Construction and operation of the facility expansion will not affect Honokowai Stream or shoreline. Most of the project site is in excess of 1,000 feet from the stream. No structures or pipes will be constructed adjacent to or connected to the stream. All effluent will be disposed of onsite in four injection wells or pumped to the existing County reservoir for distribution to PMCo. ditches and cane fields for irrigation.

Standby power is provided, along with multiple structures and equipment to provide process reliability and backup. Gravity overflow is provided to the injection wells, further minimizing any chance for the effluent to impact offsite areas.

A second letter was received from DLNR on January 12, 1983. They commented: "Under construction activities, we suggest that appropriate erosion-sedimentation control measures be utilized to minimize degradation of near shore waters. Proposed measures should be fully described in the environmental impact statement."

No construction activities will occur in proximity to the shoreline. The environmental impact statement outlines erosion control measures that will be used on the construction site. In addition, an erosion control plan has been prepared.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR A. HAYASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

RECEIVED
DEC 21 1982
WASTE MANAGEMENT DIV.
COUNTY OF MAUI

REF. NO.: LN 1210

DEC 15 1982

CPO-1041 Management Division

	Info	Action	Initial	File	Copy
EQC:					
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[illegible] H.	1				
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[illegible] M.					
[illegible] C.					
[illegible] G.					
Others					

Mr. Ralph Hayashi, Director
Department of Public Works
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Hayashi:

We have reviewed the EIS Preparation Notice for expansion of the Kaanapali wastewater treatment facility, published in the EQC Bulletin of November 8, 1982.

We note that the above publication initiates a thirty (30) day period during which requests will be accepted for individuals and agencies to participate as consulted parties in the EIS process for this project. Our Department wishes to function as a consulted party in this matter, in view of the natural resource values which may be potentially affected.

We understand that the proposed expansion would take place on an 8-acre Agricultural District parcel, owned by the State and tentatively set aside to the County, the parcel being situated immediately mauka of the Honokowai turnoff from Hono a Piilani Highway. Sitework may therefore take place adjacent to Honokowai Stream and within a mile from a shoreline high in resource and recreational values. Therefore, to assist preparation of the EIS, our Division of Aquatic Resources wishes to suggest at this time the forthcoming EIS should include discussion of existing resources and uses of stream and shoreline, should detail potential effects of expansion sitework and plant operation (including disposition of treated wastewater) on these aquatic environments, and should address measures to mitigate any adverse impacts.

We appreciate this opportunity to advance our suggestions and look forward to reviewing the draft EIS.

Very truly yours,

SUSUMU ONO, Chairman
Board of Land and Natural Resources

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

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JAN 12 8 59 PM '83
WAILUKU, HI 96793

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JAN 14 1983
WASTE MANAGEMENT DIV.
COUNTY OF MAUI

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

January 10, 1983

Mr. Ralph Hayashi
Director of Public Works
County of Maui
Department of Public Works
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Hayashi:

Thank you for allowing us to participate in the consultation process during the preparation of the environmental impact statement for the proposed expansion of the Lahaina wastewater treatment facility.

We have reviewed the project summary provided and at this time, offer the following comment.

Under construction activities, we suggest that appropriate erosion-sedimentation control measures be utilized to minimize degradation of near shore waters. Proposed measures should be fully described in the environmental impact statement.

Very truly yours,

SUSUMU ONO
Chairman of the Board

Waste Management Division	Info	Action	Reply	File	Copy
Ed K.					
Alice A.					
Glen H.	✓			✓	
Alex N.					
Yvonne M.					
Alisa A.					
Dominick M.					
Alan C.					
Gary G.					
[illegible]					
Signed					

Section XIV
COMMENTS AND RESPONSES DURING REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Four letters were received at the completion of the draft EIS review period that require responses. All other letters indicated that the reviewing body had no comment or indicated support for the proposed project. The letters requiring responses and the necessary responses follow.

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FT. SHAFTER, HAWAII 96858

February 3, 1983

Ms. Jacqueline Parnell, Director
Office of Environmental Quality Control
550 Halekauwila Street Room 301
Honolulu, Hawaii 96813

Dear Ms. Parnell:

Thank you for the opportunity to review the Environmental Impact Statement (EIS) for the proposed Lahaina Wastewater Treatment Plant Expansion, Honokowai, Maui, Hawaii. Based on our review, we provide the following comments:

a. A Department of the Army (DA) permit will not be required for the proposed project.

b. Reference Section II-C on page II-2 of the EIS: Zone C areas on the County's flood hazard maps prepared by the Federal Insurance Administration, are not regulatory flood plain areas but rather "areas of minimal flooding" under the Flood Insurance Study for Maui County. Shallow flooding areas are designated Zone AO, not Zone C; and are considered flood plain and special flood hazard areas.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Copy Furnished:
Honorable Hannibal Tavares
Mayor of the County of Maui

CH_2M Hill
2020 Southwest 4th Ave., 2nd Floor
Portland, Oregon 97201
ATTN: Nancy Tuor

Mr. Ralph Hayashi, Chief Engineer
County of Maui, Dept of Public Works
200 South High Street
Wailuku, Hawaii 96793

HANNIBAL TAVARES
Mayor

RALPH HAYASHI, P.E.
Director of Public Works

LESTER NAKASATO, P.E.
Deputy Director of Public Works

DIVISIONS
Engineering
Highway Construction and Maintenance
Land Use and Codes Enforcement
Waste Management

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

March 4, 1983

Mr. Kisuk Cheung
Chief, Engineering Division
Department of the Army
Pacific Ocean Division, Corps of Engineers
Ft. Shafter, Hawaii 96858

Dear Mr. Cheung:

Thank you for your letter dated February 3, 1983, concerning your review of the Draft Environmental Impact Statement for the proposed Lahaina Wastewater Treatment Plant Expansion, Honokowai, Maui, Hawaii.

We have since revised Section II-C relative to the definition of flood areas based on your comment.

Thank you for your assistance.

Very truly yours,

Ralph Hayashi
Director of Public Works

cc: Roy Sakamoto, OEQC

FEB 1 6 1983

Ms. Jacqueline Parnell, Director
Office of Environmental Quality Control
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Dear Ms. Parnell:

Thank you for the opportunity to review the draft statement of the impact of an expanded Lahaina sewage plant on the environment.

The draft addresses concerns raised by our December 15, 1982 letter. Specifically, that,

(1) during construction, erosion-control measures would be employed (detailed on p. VIII-3);

(2) "most" of the proposed site is more than 1,000 feet from the stream and no connections between the proposed facility and stream would be installed (p. IV-5 to -6);

(3) existing drainage patterns would not be significantly altered (p. VIII-2) although a containment berm around the proposed facility would be constructed to contain any inadvertent wastewater spills (p. IX-2);

(4) wastewaters would be subjected to "full secondary" treatment (p. "v");

(5) effluent would be disposed by discharge into existing injection wells or by addition to an existing effluent-irrigation system (p. I-9), and

(6) the proposed facility could lead to permanent closure of nearby privately operated treatment plants which are prone to failure (pp. IV-5 to -6).

Since the draft addresses these six items of concern, we find the draft adequately covers the protection of aquatic resources.

The draft also states that an erosion control plan has been prepared. It discusses several mitigating measures for control of dust and erosion. Accordingly, we find that the draft adequately covers concerns expressed in our January 10, 1983 letter regarding appropriate controls for erosion and sedimentation problems.

The draft states that site improvements are not expected to impede or divert storm flows crossing the site. However, the proposal calls for a berm around the facility to contain overflow in the event of equipment failure. It is suggested that the impact of the berm (shown in Figure 3) on site drainage plans be discussed.

Inasmuch as the proposed project entailed use of treated effluent for irrigation purposes, we find that it promotes conservation of water resources. Accordingly, we wish to voice our support of this purpose.

Sincerely,

Susumu Ono

SUSUMU ONO
Chairman of the Board

cc: CH2M Hill, Portland, Oregon
Hon. Ralph Hayashi

HANNIBAL TAVARES
Mayor

RALPH HAYASHI, P.E.
Director of Public Works

LESTER NAKASATO, P.E.
Deputy Director of Public Works

DIVISIONS

Engineering

Highway Construction and Maintenance

Land Use and Codes Enforcement

Waste Management

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

83-875

March 2, 1983

Mr. Susumu Ono
Chairman of the Board
Hawaii Department of Land
and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Ono:

SUBJECT: LAHAINA SEWAGE TREATMENT PLANT EXPANSION
Draft Environmental Impact Statement

Thank you for your letter of February 16, 1983, which discusses the Draft Environmental Impact Statement (EIS). Your comment regarding the impact of a berm on site drainage (page 1X-2) will be revised in the final EIS; however, we felt it appropriate to respond by letter to you.

The concept of constructing a berm around the site to contain any overflow due to equipment failure was deleted in the final design. We thought that the likelihood of an overflow was extremely slight compared with the importance of minimizing the drainage impacts. However, as a further measure to minimize any potential for overflow, the design uses only gravity flow throughout the major treatment processes including the injection wells. Multiple units with ample freeboard and automatic bypassing, even in the event of power outages or equipment failure, are provided in lieu of a containment berm option. Standby power for the major treatment processes is also provided as an additional backup measure.

Please let me know if additional information is desired.

Very truly yours,

Ralph Hayashi
Director of Public Works

cc: Roy Sakamoto, OEQC

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

February 22, 1983

RE:0368

Mayor Hannibal Tavares
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Draft Environmental Impact Statement
Lahaina Wastewater Treatment Plant Expansion
Lahaina, Maui, Hawaii

Dear Mayor Tavares:

Thank you for the opportunity to review the above document. Our Environmental Center review has been prepared with the assistance of Gordon Dugan, Civil Engineering; Lee Hannah, Jacquelin Miller and Mark Ingoglia, Environmental Center.

Several areas have been identified by our reviewers as needing clarification and/or expansion in the revised EIS. Much work and effort has been placed on the social impacts of the waste treatment expansion, yet basic information concerning the wastes and effluent is lacking. The use of wastewater effluent for agricultural irrigation on adjacent cane fields is mentioned throughout the document, yet there is little indication that a thorough economic analysis has been done to substantiate the conclusion that this practice would be prohibitively expensive.

Effluent Description and Disposal Methods

To better describe the quality of the effluent being produced from the sewage facility at present and after the proposed construction, a compositional characterization of the present and expected effluent should be included. Environmental Quality Commission EIS Regulations section 1:42 paragraph b item 6 states "The EIS shall, at minimum, contain....summar technical data; diagrams; and other information necessary to permit an evaluation of potential environmental impact by commenting agencies and the public."

Further, Section 142 end of paragraph e states "if the proposed action constitutes a direct or indirect source of pollution as prescribed by any governmental agency, necessary data shall be incorporated in the EIS." The analysis should include heavy metals and nutrient content of the existing effluent. Since the use of effluent water for irrigation is a possible option, heavy metals should be quantified and nutrient levels known to help determine the appropriateness of the effluent for the irrigation option.

Pumping cost is described as preventing the use of the effluent water for irrigation purposes. A description of the economic analysis leading to this conclusion should be included in the revised EIS. Again, Section 142 paragraph i, of the EIS regulations states,

"where a particular mitigation measure has been chosen from among several alternatives, the measures should be discussed and reasons should be given for the choice made." Saltation of cane fields is described as having reduced production (pg. 4-2). Would the savings on fertilizer and the reduction of saltation through the use of effluent water on cane fields have a significant effect on the economics of using the effluent water?

Sludge Disposal Methods

To better understand the effects of sludge disposal, an analysis of the present and expected sludge composition should be included in accordance with the EQC regulations cited previously.

Injection Wells

A description of the injection wells and a figure illustrating their specific location and dimensions, with a geologic profile would help in evaluating the impacts of the wells. Is there a projected percolation distance and will the coastal waters be monitored for increased pollutant levels?

Drafters of the DEIS are to be commended for their comprehensive treatment of the social impact analysis. The data and the analysis of the impacts associated with the disposal of the effluent and sludge are lacking.

We appreciate the opportunity to comment on the DEIS and look forward to your response to our concerns.

Yours truly,

Doak C. Cox
Director

cc: Jacqueline Parnell, OEQC
Ralph Hayashi, Department of Public Works
Nancy Tuor, CH_2M Hill
Gordon Dugan, Civil Engineering
Lee Hannah, Environmental Center
Jacquelin Miller, Environmental Center
Mark Ingoglia, Environmental Center

HANNIBAL TAVARES
Mayor

RALPH HAYASHI, P.E.
Director of Public Works

LESTER NAKASATO, P.E.
Deputy Director of Public Works

DIVISIONS

Engineering

Highway Construction and Maintenance

Land Use and Codes Enforcement

Waste Management

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

March 2, 1983

Mr. Doak C. Cox
Director
University of Hawaii at Manoa
Environmental Center
Crawford 317, 2550 Campus Road
Honolulu, Hawaii 96822

Dear Mr. Cox:

Subject: Draft EIS for Lahaina Wastewater Treatment Plant Expansion

The following information is in response to your February 22, 1983, letter to Mayor Hannibal Tavares regarding your staff's review of the draft EIS. The answers to your questions are in the order they are posed.

Effluent Description and Disposal Methods

Statement: "...a compositional characterization of the present and expected effluent should be included."

Answer: A characterization of the Lahaina influent was done by University of Hawaii staff for the Park Engineering Lahaina WWTP study in August 1971. A copy is attached. In addition, the most recent (November-December 1982) bi-monthly operational report for the treatment plant is also attached. Based on the current operating reports, the strength of influent sewage is somewhat weaker today than that observed in 1971.

As shown in the operating reports, the average monthly effluent BOD_5 values are 12.2 and 7.2 mg/l and effluent total suspended solids values are 2.4 and 2.9 mg/l, respectively. It is important to note that these values were obtained while the plant was operating at the near-design flows of 2.99 and 3.13 mgd, respectively (design flow is 3.20 mgd). Nutrient level information is also listed. A heavy metals analysis of the effluent was not run since the same analysis of the sludge indicated very low heavy metals values (discussed later).

Based on the foregoing, we do not expect the effluent quality will change from that already observed, since the additional Kaanapali and Napili-Honokowai connections serve the same residential and commercial cross section that is now connected.

There are no significant industrial connections now, and none are anticipated in the future. The existing sewer ordinance prohibits discharge of potentially harmful or toxic substances to the sewer system.

Statement: "Pumping cost is described as preventing the use of the effluent water for irrigation purposes. A description of the economic analysis leading to this conclusion should be included in the revised EIS."

Answer: When the Lahaina WWTP went into operation in June 1980, all of the effluent was pumped to a reservoir at an elevation of about 700 that fed the Pioneer Mill Company (PMCo) irrigation system. This is in accordance with an agreement developed between the County and PMCo. In November 1981, CH2M HILL completed an energy management study for the County. The annual cost of pumping the effluent to the reservoir was calculated to be $293,000 (based on 2,900,000 kWh at 9 cents per kWh). Based on the current flows and energy costs, the net cost of pumping to the reservoir is about 34 cents per 1,000 gallons. PMCo currently obtains its irrigation water for approximately 1.4 cents per 1,000 gallons.

To reduce energy costs, the County is discharging a large portion of the flow to two injection wells put into operation in May 1982. The flow (1,000 gallons per minute) from one pump is still pumped to the reservoir. The option of using more (or all) of the effluent for irrigation is still available as the economics become more attractive. There is additional Amfac development planned for areas closer to the plant and at lower elevations. The future use of effluent for golf course irrigation is certainly a viable option.

Question: "Would the savings on fertilizer and the reduction of saltation through the use of effluent water on cane fields have a significant effect on the economics of using the effluent water?"

Answer: The nutrient levels of the effluent were not judged of significant value by PMCo because of the dilution impact of the total irrigational flows used on cane land.

There is a concern, however, about the salinity level of the plant effluent and its effect on the cane. Due to the infiltration of brackish water in the Lahaina collection system, the salinity level of the effluent currently exceeds the maximum limit (450 mg/l as NaCl) established in the agreement between the County and PMCo. Connection of the Kaanapali and Napii-Honokowai flows is expected to dilute the current salinity, but the salinity of the combined flow is still projected to exceed 450 mg/l. With the level of salinity in the effluent, PMCo sees no economic value to offset the pumping costs.

Sludge Disposal Methods

Statement: "...an analysis of the present and expected sludge composition should be included..."

Answer: An analysis of the present sludge is attached. There were no significant levels of heavy metals found. The expected future sludge composition should not differ significantly from the present levels for the same reasons cited for the expected effluent characteristics.

Injection Wells

Statement: "A description of the injection wells and a figure illustrating their specific location and dimensions, with a geologic profile would help in evaluating the impacts of the wells."

Answer: The locations of the injection wells are shown on Figure 3 of the draft EIS. A reduced copy of the engineering design sheet for the injection wells is attached. A final report for Park Engineering on the drilling of an exploratory boring and a monitoring well for the Lahaina site is available. This 73-page report was prepared in July 1979 by Geolabs-Hawaii located in Honolulu. Roscoe Moss Company was in charge of the drilling operation. In addition, Roscoe Moss also drilled the two injection wells put into service about May 1982 at the Lahaina site. Copies of this detailed information are available through Maui County or Roscoe Moss if you think it is warranted.

Question: "Is there a projected percolation distance and will the coastal waters be monitored for increased pollutant levels?"

Answer: To our knowledge, projected percolation distance was not calculated. There is no plan to monitor the coastal waters since the effects of the demonstrated high quality of effluent discharged to the wells would be undetectable.

I hope this satisfactorily answers your questions regarding the draft EIS. We appreciate your input and concerns. Please contact me if you would like further information.

Very truly yours,

Ralph Hayashi
Director of Public Works

PRELIMINARY REPORT
ON
WASTE WATER QUANTITY AND CHARACTERISTIC
AT
EXISTING LAHAINA OUTFALL SEWER

BY

DR. REGINALD YOUNG
ASSOCIATE PROFESSOR

AND

DR. MICHAEL CHUN
ASSISTANT PROFESSOR

OF

DEPARTMENT OF ENVIRONMENTAL
AND SANITARY ENGINEERING
UNIVERSITY OF HAWAII
HONOLULU, HAWAII

AUGUST 1971

EXHIBIT "A"

A preliminary survey was conducted to obtain some information on the quantity and character of sewage discharged through the existing Lahaina outfall line. The survey was conducted over a 24-hour period, 14-15 July, 1971. It consisted of obtaining bi-hourly grab samples at the Ala Moana pumping station discharging the total sewered Lahaina waste load through the outfall. The samples were composited according to flow volume. Temperature, pH, dissolved oxygen (D.O.) and chloride measurements were made in the field on the bi-hourly grab samples. The composited sample was refrigerated and returned to a commercial laboratory in Honolulu for analysis of the following parameters: total dissolved solids (TDS), volatile total dissolved solids (TDVS), total kjeldahl nitrogen (organic + ammonia nitrogen), nitrate-nitrogen, total phosphates, suspended solids (SS), volatile suspended solids (VSS), settleable solids, grease, and 5-day BOD (BOD_5). Flow was obtained by metering the operating time of the pumps and multiplying that data by the rated pump capacity.

The flow chart for the study period is shown in Figure 1. It depicts the characteristic morning and evening peaks usually evidenced in domestic sewerage systems. A secondary peak in the early afternoon may be the result of restaurant operations and other noon-hour activities in the community.

The other field data obtained are shown in Figure 2. It is apparent from the chloride graph that some seawater infiltration occurs in the sewer system. During the overnight period of low flow, the chloride concentration averaged about 1700 mg/1. During daylight hours of heavy sewage flow, the chloride concentration averaged about 1400 mg/1. The chloride concentration in the Lahaina water supply is less than 50 mg/1 and normal accretion should yield a concentration in the sewage of about 200-300 mg/1.

Based on the flow chart the approximate flow for the study period was 1,075,00 gal. The domestic water consumption for Lahaina was reported as 610,000 gpd in 1968 (DOWALD Rept. No. R33). The population of that community is fairly static so it can be assumed that the present water consumption is about equal to the 1968 rate. Allowing for a 70% ratio of sewage to water consumption, the expected sewage flow would be about 400,000 gpd. It can be seen that the actual monitored flow is about 2.5 times that value. Even allowing for an increase of 50% in water consumption since 1968, the present actual sewage flow is higher than should be expected. This evaluation provides a corroborative indication of sea water or brackish ground water infiltration increasing the sewage flow to higher than expected values.

The sewage contained some dissolved oxygen, although all tests resulted in concentration less than 1.0 mg/1. The pH ranged from neutral to slightly alkaline, between 7.0 and 8.0. The temperature was warm with a range between 26 and 28.5°C. This warm temperature and detention time in wet wells in lift stations along the trunk interceptor under Front Street provide excellent opportunity for development of septic conditions. In fact, some sulfide odor was detected during the sampling operations. However, the sewage does remain relatively fresh in the system as evidenced by the near-neutral pH and the presence of some D.O. This freshness is probably the result of the high dilution due to sea water or brackish ground water infiltration.

The analysis of the composited sample yielded results that were indicative of a weak domestic sewage with low BOD_5 and SS. However, the sewage contained a high grease concentration, 111 mg/1, probably the result of restaurant operations. This high grease content may be a source of difficulty in sewage treatment operations and requires further evaluation to determine if separate pre-treatment facilities would be necessary. The sewage analyzed yields a BOD_5:N:P ratio of about

100:10:3. Compared with the usually quoted ratio of 100:15:1 as desirable for biological waste treatment, the waste may be nitrogen deficient. The total solids load is higher than usually found in domestic wastes, due of course to the high chloride content; however, a waste of similar character is processed adequately on Oahu at the Kailua sewage treatment plant by the City & County of Honolulu.

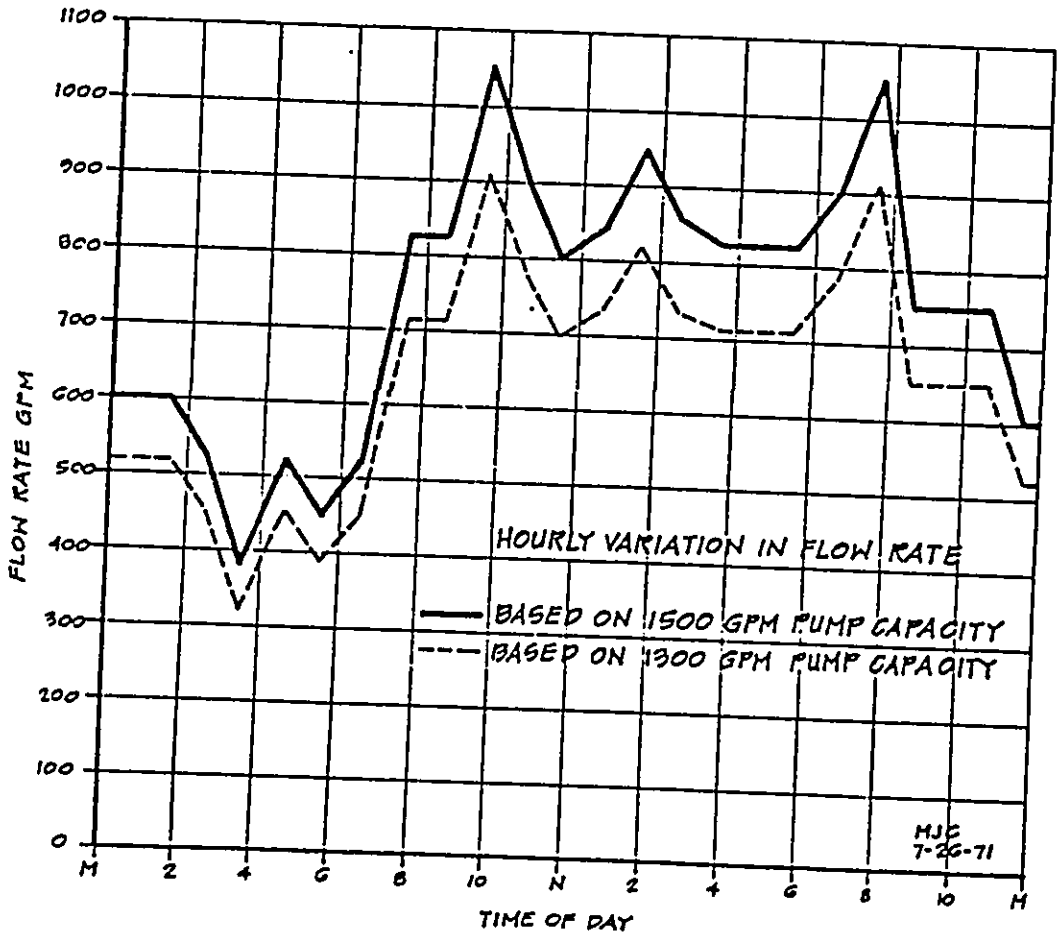
The only other sewerage system for which waste characteristics data is available is the Kaanapali resort area. An evaluation was made for that location as part of the work cited in the University of Hawaii M.S. thesis "Quantity and Characteristics of Hotel Wastes: Solid Waste and Wastewater" by L. S. Agena (Dec. 1970). Agena performed a one-week survey at the Kaanapali sewage treatment plant site, 6-13 August, 1969, obtaining grab samples at different times to evaluate the total sewage load on the plant. The results obtained can be summarized as follows for the raw waste:

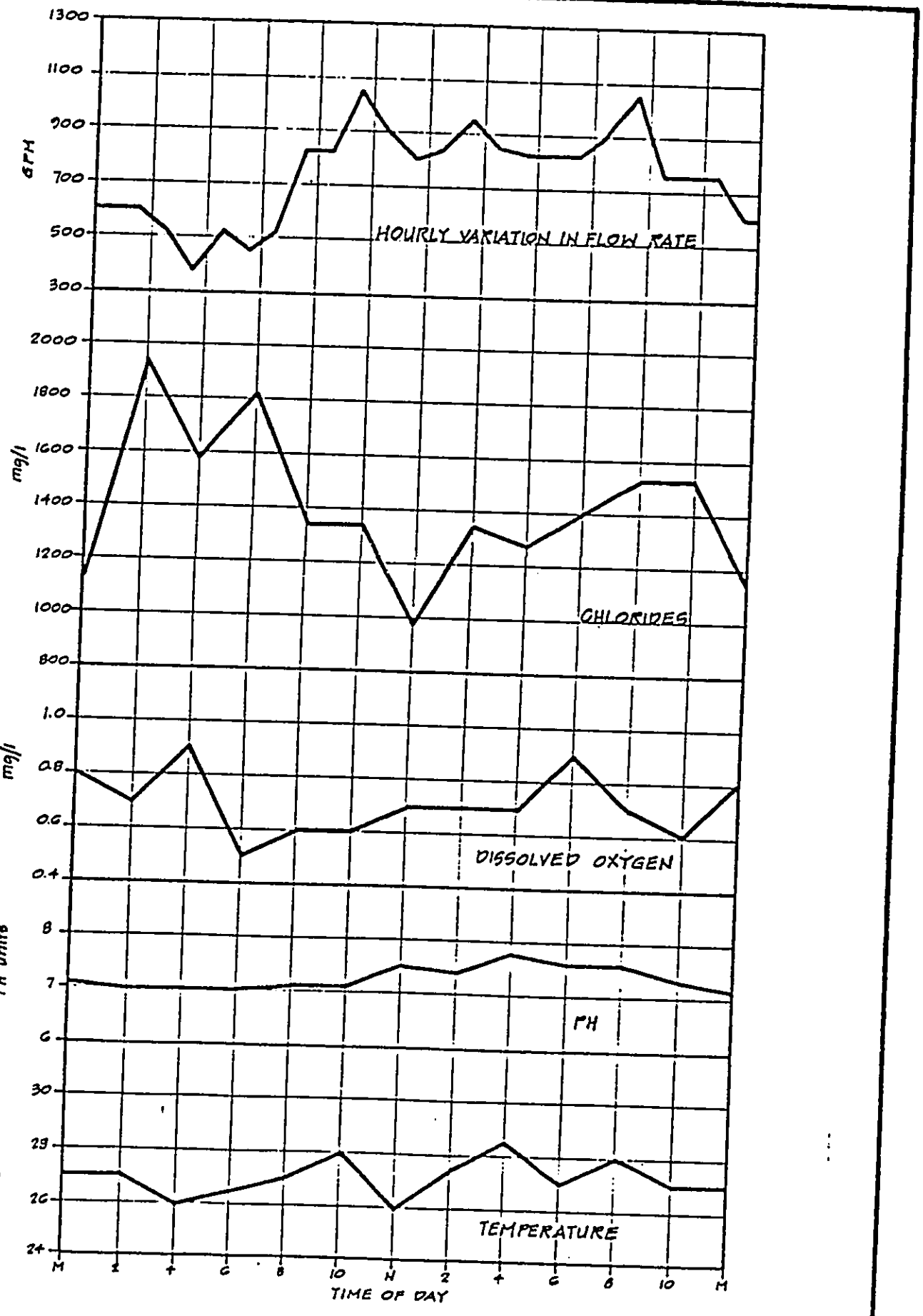
Item	*mean*	*high*	*low*
pH	6.9	7.8	5.6
Oxidation-reduction potential (ORP)	-235 mv	+55 mv	-325 mv
Dissolved oxygen (DO)	0.8 mg/1	3.5 mg/1	0.2 mg/1
PO_4 -P	37.5 "	89.0 "	8.4 "
NO_3 -N	0.15 "	0.9 "	0 "
NH_4 -N	21.7 "	48.0 "	0 "
Grease	22.8 "	110.4 "	0.5 "
BOD_5	240 "	732 "	51 "
SS	154 "	364 "	44 "

These characteristics are similar to domestic sewage. Overall for hotel wastes, Agena concluded that per capita daily contributions were as follows: 0.2 lb. BOD_5, 0.18 lb. SS, 0.029 lb. grease, and 165-200 gallons of sewage. Flow variations were marked with daily peaks at 9 A.M. and 9 P.M. and in the early afternoon, and weekly peaks on Friday-Saturday and Tuesday-Wednesday (probably related to length of stay of tour groups at the resorts).

During the work at Kaanapali, Agena encountered occasions of extremely high BOD_5 and grease contributions. This occurred when the system lift stations were flushed to clear large grease balls accumulated in the system, probably a result of ineffective grease trap operations at the restaurants and also from the hotel laundries.

No flow data was obtained for the Kaanapali study. However, the water consumption for the area was reported as 1.2 mgd in 1968 (DOWALD No. R33). Assuming a 70% waste factor and the same rate of water consumption in 1969 the sewage quantity would be about 0.85 mgd. This should be a reasonable base for estimating waste loads with the sewage characteristics reported by Agena.


1100
1000
900
800
700
600
500
400
300
200
100
0
FLOW RATE GPM
HOURLY VARIATION IN FLOW RATE
BASED ON 1500 GPM PUMP CAPACITY
BASED ON 1300 GPM PUMP CAPACITY
MJC
7-26-71
M
2
4
6
8
10
N
2
4
6
8
10
M
TIME OF DAY


1300
1100
900
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500
300
GPH
HOURLY VARIATION IN FLOW RATE
2000
1800
1600
1400
1200
1000
800
mg/l
CHLORIDES
1.0
0.8
0.6
0.4
mg/l
DISSOLVED OXYGEN
8
7
6
PH Units
PH
30
29
28
24
°C
TEMPERATURE
M
2
4
6
8
10
N
2
4
6
8
10
M
TIME OF DAY

Composite Sample From Ala Moana
Pumping Station, Lahaina, Maui

Parameter	*Concentration, mg/l*
TDS	3100
TDVS	1229
Kjeldahl-N	15.4
NO_3-N	< 0.03
PO_4-P	4.6
SS	97
VSS	81%
Settleable Solids	5 ml/l
Grease	111
BOD_5	146

MONTH November
YEAR 1987

INFLUENT DATA

PREPARED BY Lahaina STP SHEET 1 OF 6

DAY		DATE	PLANT												POWER*		REMARKS (Sample Type, Problems, Other, etc.)
			CHARACTERISTICS			LOADINGS									METER NO. 1 (KVAR)	METER NO. 2 (kWhr)	
			TOTAL DAILY FLOW	pH	CONDUCTIVITY	ALKALINITY	TOTAL SUSPENDED SOLIDS	VOLATILE SUSPENDED SOLIDS	TOTAL BOD	TOTAL COD	NITROGEN NH_4-N	Ammonia NITROGEN NH_3-N	TOTAL PHOSPHORUS				
			Q	pH	CON	ALK	TSS	VSS	TBOD	COD	NH_4-N	NH_3-N	TP				
			MGD	S.U.	umho/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l				
M	1		3.03	7.30			81	73							0	5	
T	2		2.83	7.20	2000	158	69	—	126.4	1811.0		2.4			0	4	
W	3		2.80	7.20			—	—							0	5	
Th	4		2.86	7.30	1460	—	73	56	92.2			11.2			0	4	
F	5		2.74	7.15			74	—							0	4	
S	6		2.72	7.15			175	150							0	5	
Su	7		2.80	7.10			64	59							0	4	
M	8		2.80	7.10			119	109							0	5	
T	9		2.85	7.20	1470	152	190	136	131.7	293.1		12.6			0	5	
W	10		2.73	7.20			—	—							0	6	
Th	11		2.73	7.10	1800	147	96	73	77.5	—		13.9	2.9		0	7	
F	12		2.82	7.15			151	135							0	7	
S	13		2.75	7.10			58	52							0	7	
Su	14		3.16	7.00			49	—							0	7	
M	15		2.76	7.20			51	46							0	7	
T	16		2.84	—	1460	140	60	56	74.4	201.1		11.2			0	8	
W	17		2.81	7.00			187	170							0	7	
Th	18		2.83	7.20			112	104							0	7	
F	19		2.58	7.20			122	111							0	7	
S	20		2.67	7.10			107	100							0	7	
Su	21		3.60	7.20			62	58							0	4	
M	22		3.34	7.20			290	—							0	4	
T	23	*	3.73	7.30	1710	147	70	61	91.7	175.8		12.0	—		0	6	
W	24		3.22	7.10			59	56							0	2	
Th	25		3.20	7.10			99	88							0	5	
F	26		3.56	6.95			140	127							0	5	
S	27		3.70	6.90			153	140							0	5	
Su	28		3.20	7.15			155	131							0	4	
M	29		3.68	7.20			61	58							0	4	
T	30		3.65	6.90			56	50							0	51	
	31														0	4	
TOTAL																	
AVG.			2.99				1650	149	105	88	99.0	213.0	10.6	2.9	0	5.3	

*Bw Tower #2 Call Stuck

*NO. x A MULTIPLIER OF = ACTUAL CONSUMPTION

TERTIARY/DISINFECTION/MICROBIAL

MONTH Novzuce
YEAR 1982

PREPARED BY LAHAINA STP SHEET 5 OF 6

DAY	DATE	PLANT: FILTER: NUMBER OF CELLS IN SERVICE	PERFORMANCE: EFFLUENT TURBITY	EFFLUENT TOTAL SUSPENDED SOLIDS	EFFLUENT TOTAL BOD	EFFLUENT COD	CONDUCTIVITY	CHLORIDES	FECAL COLIFORM	pH	DISINFECTION: CHLORINE DOSE RATE	CHLORINE RESIDUAL	MICROBIAL QUALITY – BIOLOGICAL SYSTEM: FLOC *1	FILAMENTS *2	LIFE *3	DIVERSITY *4	PREDOMINANCE *5	HIGHER ORGANISMS *6	INDICATE ORGANISMS *6	Disposal: EFFLUENT DISPOSAL METHOD *7	REMARKS (Sample Type, Problems, Other, etc.)
			NTU	TSS mg/l	TBOD mg/l	TCOD mg/l	umho/l	mg/l	org/100ml FC	pH SU	Cl2 lbs/day	mg/l									
M	1	3		1.2						7.20	250										
T	2			2.0	13.4	68.2	1800	595	2/100	7.10	170										
W	3			1.6						7.20	240										
Th	4		1.9	3.2	15.1			530	0	—	180										
F	5			1.2						7.20	260										
S	6			1.2						7.10	240										
Su	7			3.6						7.20	220										
M	8			2.0						7.20	200										
T	9		2.6	4.4	15.9	92.0	1500	435	0	7.20	—										
W	10			2.6						7.20	180										
Th	11		2.3	0.4	16.5	—	1810	440	0	7.20	160										
F	12			3.2						7.10	180										
S	13			1.6						7.20	200										
Su	14			1.6						7.10	180										
M	15			2.4						7.10	200										
T	16		2.4	2.4	6.6	57.5	1430	470	1/100	—	160										
W	17			1.6						7.10	200										
Th	18			6.4						7.10	240										
F	19			3.6						7.20	220										
S	20			1.6						7.20	220										
Su	21			1.2						7.10	220										
M	22			2.0						7.1	220										
T	23		1.1	1.2	5.5	90.7	1500	500	0/100	7.20	chlorine										
W	24			1.2						7.10	230										
Th	25			1.2						7.0	220										
F	26			2.0						6.90	120										
S	27			2.4						7.05	190										
Su	28			0.4						6.90	chlorine										
M	29			10.8						7.25	120										
T	30	↓		1.2						7.10	240		1								
	31																				
TOTAL																					
AVG.			-2.0-	2.4-	12.2-	77.1-	1568-	495-	0/100	-	-										

#1 NEG, NORM, DENS
#2 LOW, MED, HIGH
#3 LOW, NORM, HIGH
#4 LOW, NORM, HIGH
#5 SC = Stalked Ciliates, FS = Free Swimmers, F = Flagellates, A = Amobae, O = Other
#6 Yes, No, Explain on Back
#7 R = Reservoir, I = Injection Wells

INFLUENT DATA

MONTH December

YEAR 1982

PREPARED BY Lanaina STP

SHEET 1 OF 6

DAY	DATE	PLANT CHARACTERISTICS: TOTAL DAILY FLOW (Q, MGD)	pH (pH, S.U.)	CONDUCTIVITY (CON, umho/l)	ALKALINITY (ALK, mg/l)	LOADINGS: TOTAL SUSPENDED SOLIDS (TSS, mg/l)	VOLATILE SUSPENDED SOLIDS (VSS, mg/l)	TOTAL BOD (TBOD, mg/l)	TOTAL COD (COD, mg/l)	AMMONIA NITROGEN (NH_4-N, mg/l)	NITRATE NITROGEN (NH_3-N, mg/l)	TOTAL PHOSPHOROUS (TP, mg/l)	POWER*: METER NO. 1 (KVR)	METER NO. 2 (kWh)	REMARKS (Sample Type, Problems, Other, etc.)
W	1	3.01	7.00			62	62						0	.4	
Th	2	3.50		1370	146			250.0			14.1		0	5	
F	3	3.33	7.20			359	326						0	4	NO POWER IN RECYCLE SLUDGE ROOM
S	4	3.32	7.10			109	97						0	.4	
Su	5	3.46	7.20			59	54						0	5	
M	6	3.42	7.10			73	63						0	4	
T	7	3.52	7.20	1310	147	87	83	134.4	323.2		14.0		1	5	
W	8	3.46	7.10			122	116						0	5	
Th	9	3.41	7.10			128	116						0	4	[illegible] CLARIFIER #3-4 DOWN FOR REPAIRS
F	10	3.34	7.05			93	78						0	.4	
S	11	2.72	7.25			70	68						0	5	
Su	12	2.97	7.10			73	—						0	.4	BACKWASH FILTER CELL STUCK
M	13	2.67	7.15			58	55						0	4	
T	14	3.12	7.25			60	48						0	4	
W	15	3.12	7.10			44	41						0	5	
Th	16	2.97	7.20			100	56						0	4	
F	17	2.97	7.10			250	215						0	5	
S	18	2.25	7.10			49	46						0	4	
Su	19	3.12	7.25			103	92						0	5	
M	20	3.02	7.10			39	37						0	4	
T	21	3.28	7.00			53	—						0	5	
W	22	2.55	7.15			80	78						0	5	
Th	23	3.36	7.05			86	80						0	4	
F	24	3.04	7.00			170	101						0	4	
S	25	3.01	7.00			41	35						0	4	
Su	26	2.83	7.10			61	54						0	6	
M	27	3.55	7.15			80	71						0	5	
T	28	3.16	7.15			567	556						1	5	
W	29	3.24	7.20			78	72						0	4	
Th	30	3.16	7.00			66	55						0	4	
F	31	3.32	7.00			92	74						0	5	
TOTAL		97.0	X												
AVG.		3.13	X	1340	146	109	101	192.2	323.2		14.05		.06	4.5	

*NO. x A MULTIPLIER OF

- ACTUAL CONSUMPTION

MONTH *DECEMBER*
YEAR *1983*

TERTIARY/DISINFECTION/MICROBIAL

PREPARED BY *LAHAINA* SHEET *5* OF *6*

DAY	DATE	PLANT: FILTER: NUMBER OF CELLS IN SERVICE	PERFORMANCE: EFFLUENT TURBITY	EFFLUENT TOTAL SUSPENDED SOLIDS	EFFLUENT TOTAL BOD	EFFLUENT COD	CONDUCTIVITY	CHLORIDES	FECAL COLIFORM	pH	DISINFECTION: CHLORINE RESIDUAL	CHLORINE DOSE RATE	MICROBIAL QUALITY – BIOLOGICAL SYSTEM: FLOC *1	FILAMENTS *2	LIFE *3	DIVERSITY *4	PREDOMINANCE *5	HIGHER ORGANISMS *6	INDICATE ORGANISMS *6	Disposal: EFFLUENT DISPOSAL METHOD *7	REMARKS (Sample Type, Problems, Other, etc.)
				TSS	TBOD	TCOD			FC	pH	CL2									
			NTU	mg/l	mg/l	mg/l	umho/l	mg/l	org/100ml	SU	mg/l	lbs/day								
W	1	3		2.8						7.10		240								
Th	2		3.7			19.4	1400	440	9/100ml			220								
F	3			8.0						6.95		240								NO POWER IN RECYCLE SLUDGE ROOM
S	4			1.2						7.10		240								
Su	5			1.2						6.90		240								
M	6			1.2						—		60								
T	7		1.6	1.2	7.2	61.0	1345	420	4/100ml	7.2		260								
W	8			8.0						7.10		220								
Th	9			0						6.95		260								
F	10			3.2						7.10		260								2° CLARIFIER'S #3-4 DOWN FOR REPAIRS
S	11			1.6						7.15		[illegible]								
Su	12			1.C						7.10		260								
M	13			8.6						7.10		260								
T	14			1.2						7.20		260 CHG.								
W	15			1.6						7.20		CYLINDER								
Th	16			2.8						7.20		200								
F	17			1.6						7.10		240								
S	18			8.0						7.20		240								
Su	19			4.0						7.15		240								
M	20			8.0						7.10		220								
T	21			8.0						7.50		220								
W	22			2.4						7.10		240								
Th	23			0						7.05		200								
F	24			0						7.20		220								
S	25			0.8						6.90										
Su	26			0.8						7.15		160								
M	27			5.2						7.0		240								
T	28			2.8						7.20		260								
W	29			2.4						7.30		240								
Th	30			1.2						7.30		220								
F	31			0.8						6.95		160								
TOTAL																				
AVG.				3.44	7.2	40.2	1372	430	7/100			225								

#1 NEO, NORM, DENS
#2 LOW, MED, HIGH
#3 LOW, NORM, HIGH
#5 SC = Stalked Ciliates, FS = Free Swimmers
F = Flagellates, A = Amoeba, O = Other
#6 Yes, No, Explain on Back
#7 D = Recycle, I = Injection Wells

GEORGE R. ARIYOSHI
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February 18, 1983

MEMORANDUM

To: Honorable Hannibal Tavares
Mayor, County of Maui

Subject: Draft Environmental Impact Statement for
Lahaina Wastewater Treatment Plant Expansion
Department of Public Works, County of Maui
TMK: 4-4-02: por. 3 and 29
Honokowai, Lahaina, Maui

The Department of Agriculture has reviewed the subject Draft Environmental Impact Statement (EIS) and offers the following comments.

According to the subject EIS, the applicant desires to expand the existing Lahaina wastewater treatment facility capacity by 3.5 million gallons per day (MGD). The proposed facilities are to be funded and constructed by Amfac Property Corporation and will be operated and ultimately owned by the applicant. Amfac Property Corporation reserves the use of 3.16 MGD of the total projected 6.7 MGD capacity of the combined existing and proposed facilities for current and future resort expansion in the Kaanapali area. The County of Maui will have the remaining 3.54 MGD to meet existing and future municipal wastewater treatment demands.

The subject 8-acre area is part of a 172-acre parcel owned by the State of Hawaii and leased to Pioneer Mill Company for sugarcane production. The applicant's request for an Executive Order setting aside the subject area for the proposed expansion was approved by the Board of Land and Natural Resources on March 12, 1982. The Maui County Planning Commission issued a Special Use Permit for the proposed project on December 17, 1982. A copy of our memorandum on the Special Use Permit dated October 29, 1982, is attached. Conditions attached to the permit require the applicant to begin construction of the facility within one year and that a State Land Use District Boundary amendment from the Agricultural to Urban District be sought within five years.

In addition to the U.S. Soil Conservation Service and Land Study Bureau analyses of the soil properties on the subject site (EIS, page II-1 and 2), the subject parcel has been classified as "Prime" according to the Agricultural Lands of Importance to the State of Hawaii (ALISH system.

We note that the effluent from the wastewater treatment process could be used to irrigate Pioneer Mill's cane fields and that the sludge could be utilized as a fertilizer/soil conditioner (EIS, page I-10 and 11). We encourage the use of treated effluent for agricultural irrigation under appropriate conditions [State Agriculture Plan, Implementing Action C(2)(b), October 1982].

The EIS states that the " ... proposed facility will accommodate a portion of the future growth outlined in the proposed Lahaina Community Plan" (EIS, page vii). Part of this future growth is proposed for over 300 acres of agricultural lands mauka of Honoapiilani Highway and above the Kaanapali airstrip. According to the subject EIS, the Pioneer Mill Company staff indicates that, "... acreage reductions from the planned community and resort development (about 320 acres, including the facility expansion site) will not significantly and negatively impact plantation productivity and profitability" (EIS, page IV-2). From a cursory review of our records, this land area subject to development is largely classified as "Prime" according to the Agricultural Lands of Importance to the State of Hawaii system. Likewise, the Land Study Bureau Overall Productivity Rating for the area is predominantly "A" and "B" which indicates good to very good productivity potential for many agricultural products. We note that Pioneer Mill staff has indicated that, "... about 350 reserve acres of fallow agricultural land are available to be returned to sugarcane production if so needed (EIS, page VIII-1). The conditions under which these reserve lands could be favorably used for agriculture by Pioneer Mill should be addressed.

As noted in our response to the Special Use Permit petition submitted for this project, we feel that it is axiomatic that the urbanization of prime agricultural lands indefinitely forecloses future agricultural use of these lands. A facility such as a wastewater treatment plant has secondary impacts that go far beyond the boundaries of the plant site itself.

The EIS should reflect the fact that the Hawaii State Plan (Chapter 226, Hawaii Revised Statutes) contains objectives relating to the increased viability of the sugar and pineapple industries and the continued growth and development of diversified agriculture (Section 226-7, HRS). Correspondingly, it is the policy of this State to "Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs" [Section 226-7(b)(6)]. The Priority Directions which provide immediate focus for public and private actions in order to address major statewide problems encourage "... urban growth away from areas where other important benefits are present, such as protection of valuable agricultural land ..." [Section 226-104(c)(2)] and seek "... to accommodate urban growth in existing urban areas while maintaining agricultural lands in agricultural designation" [Section 226-105(c)].

The State Agriculture Plan (October 1982) sets forth the policies, programs, and projects for implementing the agricultural and agriculture-related objectives, policies, and priority directions contained in the Hawaii State Plan. Implementing Actions B(5)(a) and B(5)(c) address the Constitutional mandate to conserve and protect important agricultural lands and ensure the availability of agriculturally suitable lands (Hawaii State Constitution, Article XI, Section 3).

It is clear from these statements that the State interest regarding agriculture is largely directed towards the conservation and protection of important agricultural lands.

The magnitude of the urban development as proposed by Amfac (EIS, page II-8-11) is considerable. The development is anticipated in the proposed Lahaina Community Plan (Lahaina Community Plan, page 41) and the accompanying Technical Report (Lahaina Community Plan Technical Report, page 39). However, the Department of Agriculture believes that efforts should be made to ensure that the proposed wastewater treatment facility expansion and any accompanying future developments do not significantly harm the agricultural resources of the Lahaina area.

Thank you for the opportunity to comment.

Jack K. Suwa

JACK K. SUWA
Chairman, Board of Agriculture

Encl.

cc: OEQC
CH2N Hill
Maui County Public Works Department
DPED
Maui County Planning Department

HANNIBAL TAVARES
Mayor

RALPH HAYASHI, P.E.
Director of Public Works

LESTER NAKASATO, P.E.
Deputy Director of Public Works

DIVISIONS

Engineering

Highway Construction and Maintenance

Land Use and Codes Enforcement

Waste Management

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

March 4, 1983

Mr. Jack K. Suwa, Chairman
Board of Agriculture
Hawaii Department of Agriculture
1428 So. King Street
Honolulu, Hawaii 96814

Dear Mr. Suwa:

Than you for your letter dated February 18, 1983, concerning your review of the Draft Environmental Impact Statement for the proposed Lahaina Wastewater Treatment Plant Expansion, Honokowai, Maui, Hawaii. We will respond to your comments in the order in which they are raised in your letter.

Comment

"We note that Pioneer Mill staff has indicated that '...about 350 reserve acres of fallow agricultural land are available to be returned to sugarcane production if not needed (EIS, p. VIII-1).' The conditions under which these reserve lands could be favorably used for agriculture by Pioneer Mill should be addressed."

Response

Pioneer Mill is able to meet sugarcane production quotas on its currently cultivated land. Future per acre production is expected to increase due to changes in irrigation methods. As a result, the projected decreases in agricultural land are not expected to impact total plantation production. The 350 reserve acres are at a slightly higher elevation and thus would incur slightly higher irrigation costs than other land at lower elevations. However, these differences are slight, and these reserve lands could be cultivated if increased production were necessary.

Comment

"The EIS should reflect the fact that the Hawaii State Plan (Chapter 226, Hawaii Revised Statutes) contains objectives relating to the increased viability of the sugar and pineapple industries and the continued growth and development of diversified agriculture (Section 226-7, HRS). Correspondingly, it is the policy of this state to 'Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs' [Section 226-7(b)(6)]. The Priority Directions which provide immediate focus for public and private actions in order to address major statewide problems encourage '...urban growth away from areas where other important benefits are present, such as protection of valuable agricultural land...' [Section 226-104(c)(2)] and seek '...to accommodate urban growth in existing urban areas, while maintaining agricultural lands in agricultural designation' [Section 226-105(c)].

Response

An additional discussion of the Hawaii State Functional Plans has been added to the Final Environmental Impact Statement. It can be found in Section III.C.1 (State Tourism Plan) and III.C.2 (State Agriculture Plan). This section includes the comments provided in the above paragraph of your letter. A copy of that section has been enclosed.

Comment

"The State Agriculture Plan (October 1982) sets forth the policies, programs, and projects for implementing the agricultural and agriculture-related objectives, policies, and priority directions contained in the Hawaii State Plan. Implementing Actions B(5)(a) and B(5)(c) address the constitutional mandate to conserve and protect important agricultural lands and ensure the availability of agriculturally suitable lands (Hawaii State Constitution, Article XI, Section 3)."

Response

The above comments have been incorporated in Section III.C.2 of the Final Environmental Impact Statement. A copy of that section has been attached.

Comment

"The magnitude of the urban development as proposed by Amfac (EIS, page II-8-11) is considerable. The development is anticipated in the proposed Lahaina Community Plan (Lahaina Community Plan, page 41) and the accompanying Technical Report (Lahaina Community Plan Technical Report, page 39). However, the Department of Agriculture believes that efforts should be made to ensure that the proposed wastewater treatment facility expansion and any accompanying future developments do not significantly harm the agricultural resources of the Lahaina area."

Response

Two-thirds of the capacity of the proposed facility expansion will accommodate existing development. The remainder will be available to accommodate future growth as outlined in the proposed Lahaina Community Plan. When the proposed Lahaina Community Plan was prepared, the County of Maui evaluated a variety of land use options. Due to the land configuration of West Maui, it was necessary to designate some agricultural lands for urban use in order to meet the County's economic, housing supply, and tourism objectives. It is the County's intent to minimize impacts on agricultural resources by designating for urban use those agricultural lands that would least affect plantation production. The plan attempts to minimize impact on agricultural land throughout Maui County. The County of Maui will continue to minimize the impacts of future developments on the agricultural resources of the Lahaina area.

Thank you for your comments.

Very truly yours,

Ralph Hayashi
Director of Public Works

cc: Roy Sakamoto, OEQC

Plng
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October 29, 1982

MEMORANDUM

To: Mr. Tosh Ishikawa, Director
Planning Department, County of Maui

Subject: State Special Use Permit Application
Expansion of Lahaina Wastewater Treatment Facilities
Department of Public Works, Maui County
TMK: 4-4-02: por. 3 and 29

The Department of Agriculture has reviewed the subject application and offers the following comments.

According to the subject application, the applicant desires to expand the existing Lahaina wastewater treatment facility capacity by 3.5 million gallons per day (MGD). The proposed facilities are to be constructed by Amfac Property Corporation and will be operated and ultimately owned by the applicant. Amfac Property Corporation reserves the use of 3.16 MGD of the total projected 6.7 MGD capacity of the combined facility for current and future resort expansion. The remaining capacity is for County use. The subject petition states that by late 1983, the existing County wastewater treatment facility will attain its rated capacity of 3.2 MGD.

The subject 3-acre area is part of a 172-acre parcel owned by the State of Hawaii and leased to Pioneer Mill Company for sugarcane production. The applicant's request for an Executive Order setting aside the subject area for the proposed expansion was approved by the Board of Land and Natural Resources on March 12, 1982.

The subject land area is bordered to the south by a light industrial and transportation facility, to the west by Honoapiilani Highway and the Kaanapali Airstrip in the Urban District, to the east by extensive sugarcane producing lands in the Agricultural District, and to the north by the existing County sewage treatment plant.

The subject parcels are composed of lands classified as "Prime" by the Agricultural Lands of Importance to the State of Hawaii system. The Soil Conservation Service Soil Survey identifies the predominant soil as Ewa silty clay loam (EaA) with 0 to 3 percent slopes and is used for sugarcane production. The remainder of the subject area (approximately one acre) is composed of Pulehu silt loam (PpA) with 0 to 3 percent slopes and is also used for sugarcane production. The crop Capability Classes for these soils is I if irrigated and IVc if non-irrigated. Soils with a Capability Class of I have few limitations which restrict their use.

The subject parcels have a Land Study Bureau Overall Productivity Rating of "A". The subject parcels, if irrigated, have excellent productivity for sugarcane, orchard, vegetables, grazing and forage.

The Department of Agriculture notes that the proposed Lahaina Community Plan designates the subject parcels for public/quasi-public uses. Furthermore, should the project be approved, the Pioneer Mill may be able to "... reuse sludge and effluent as inexpensive supplementary sources of fertilizer and irrigation water." (Petition, page 16).

According to the subject application, the Pioneer Mill staff does not consider the "... withdrawal of the proposed site as significantly deleterious to their plantation operations." (Petition, page 16).

The Department of Agriculture is concerned about the implications of having the proposed treatment plant built to a capacity meant primarily to "... accommodate future resort growth as authorized by the Lahaina Civic Development Plan and the proposed Lahaina Community Plan." (Petition, pages 10-11). This growth "... is slated by the plans to occur on agriculturally-districted lands due to the currently limited extent of the urban land use district." (Petition, page 15).

It is apparent from these statements that the size of the plant is designed to benefit future urban uses on Agricultural District lands above the Kaanapali Resort as shown on the Land Use map provided in the proposed Lahaina Community Plan (prepared by Aotani and Associates, Inc., October 1981). On page 41, part of the "authorized" resort and community growth described encompasses 360 acres of land mauka of Honoapiilani Highway. From a cursory review of our records, this land area subject to development is largely classified as "Prime" according to the Agricultural Lands of Importance to the State of Hawaii system. Likewise, the Land Study Bureau Overall Productivity Rating for the area is predominantly "A" and "B" which indicated good to excellent productivity potential for many agricultural products.

It is axiomatic that the urbanization of prime agricultural lands indefinitely forecloses future agricultural use of these lands. A facility such as a wastewater treatment plant has secondary impacts that go far beyond the boundaries of the plant site itself. To simply state that the Pioneer mill will not be affected adversely by the potential withdrawal and urbanization of 300-plus acres of prime agricultural land does not mean that there is or will be no significant impacts, or that no suitable agricultural use other than sugarcane exists for these lands.

The Department of Agriculture requests that a thorough investigation of the secondary impacts of the proposed treatment plant be included as a part of the analysis of the facility and its ramifications as an "unusual and reasonable use" of agricultural lands.

Thank you for the opportunity to comment.

JACK K. SUWA
Chairman, Board of Agriculture

CH2M HILL
engineers
planners
economists
scientists

Environmental Laboratory

Date: June 18, 1982

Project No.: P16012.H1

Subject: Analysis of wastewater sludges for AMFAC. The samples were received June 8, 1982, and assgined reference No.'s 6943-6944.

Parameter as mg/l	As Received	Dry
Cadmium, Cd	0.18	7.38
Chromium, total Cr	2.19	89.8
Copper, Cu	13.2	541
Lead, Pb	1.67	68.4
Nickel, Ni	0.96	39.3
Zinc, Zn	17.5	717
Potassium, K	331	1.36%
Nitrogen forms, as N		
Ammonia	714	2.93%
Nitrate	<0.47	<19.3
Total Kjeldahl Nitrogen	2,250	9.22%
pH	8.0	--
Total Phosphate, as P	828	3.39%
Solids		
Total	2.44%	--
Volatile	1.79%	--
PCB's	<0.01	<0.41
Sodium, Na	230	9,430
Chloride, Soluble Cl (0.45µ)	313	1.28%
Calcium, Ca	373	1.53%
Magnesium, Mg	207	8,480
Iron, Total Fe	174	7,130
Manganese, Mn	2.37	97.1
Molybdenum, Mo	<0.22	<8.99

<Indicates "less than"

Note: Levels above 10,000 ppm are expressed as percent (10,000 ppm = 1%)

Corvallis Office
1600 S.W. Western Blvd., P.O. Box 428, Corvallis, Oregon 97330 503/752-4271 Cable: CH2M CVO

Parameter as mg/l	Sludge	Effluent
Soluble Boron, B	0.8	0.3

All tests are performed in accordance with current Environmental Protection Agency guidelines as published in the Federal Register.

The information shown on this sheet is test data only and no analysis or interpretation is intended or implied.

Samples will be retained 30 days unless otherwise requested.

Reported by: Mary Murphy
Mary Murphy

COLAB/047

TABLE 4

CH2M HILL

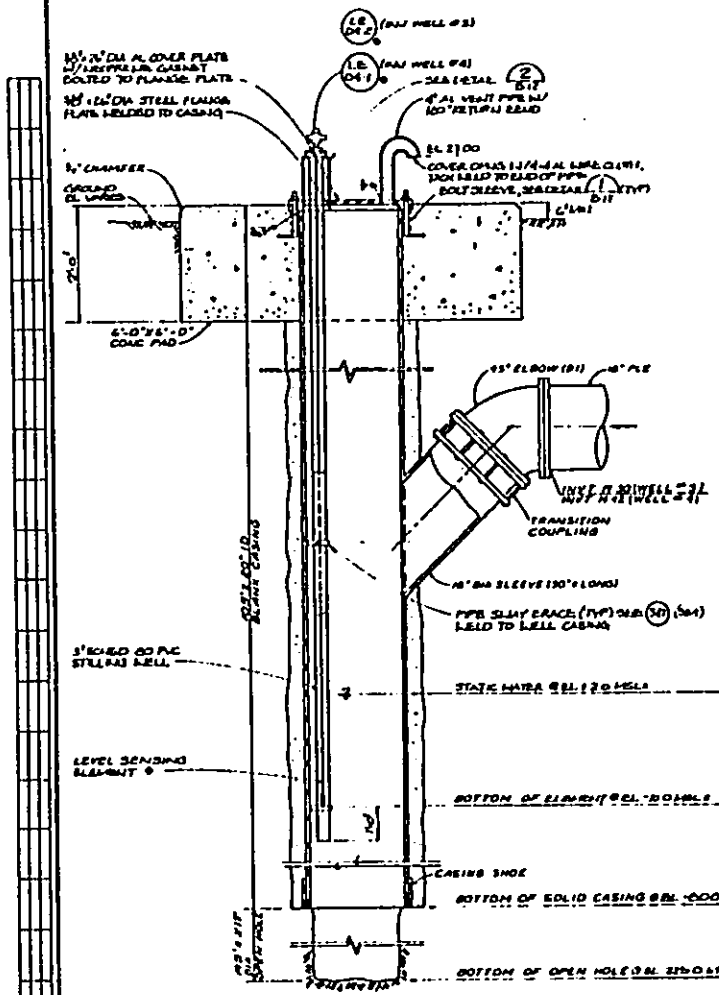
SUBJECT LAHAINA STP
AEROBICALLY DIGESTED
SLUDGE ANALYSIS

BY DMME DATE 6/14/82
SHEET NO. 1 OF
PROJECT NO. P16012.H1

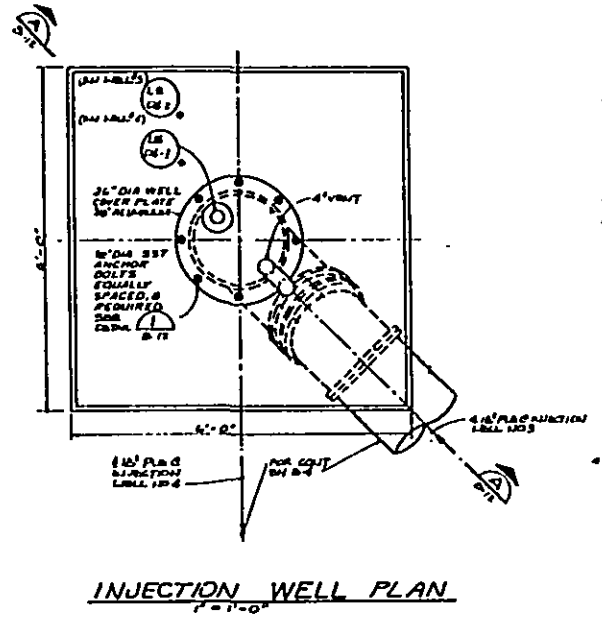
CONSTITUENT	SAMPLE #1 % DRY WT OR MG/KG	SAMPLE #2 % DRY WT OR MG/KG	SAMPLE #3	AVG.	ANALYSIS FOR A * 4 DRY TON LOADING POUNDS/ACRE
HUMUS (ORGANIC MATTER)					6000
PRIMARY NUTRIENTS					
TOTAL NITROGEN AS N			(326 # AVAIL. N/AC)		735
ORGANIC, %	6.29				500
AMMONIA, %	2.93				234
NITRATE, mg/kg	<19.3				.15
PHOSPHORUS AS P, %	3.39		(620 #/AC AS P_2O_5)		270
POTASH AS K, %	1.36		(130 #/AC AS K_2O)		110
SECONDARY NUTRIENTS					
CALCIUM AS Ca, %	1.53		(170 #/AC AS CaO)		120
MAGNESIUM AS Mg, %	0.85		(110 #/AC AS MgO)		70
SOLUBLE SULFATE AS S	—				x
MICRO NUTRIENTS					
BORON AS B (HOT WATER SOLUBLE)	0.8				0.006
COPPER AS Cu	541				4.3
IRON AS Fe	7,130				57.0
MANGANESE AS Mn	97.1				0.78
MOLYBDENUM AS Mo	<8.99				x 0.07
ZINC AS Zn.	717.				5.7
OTHER					
ARSENIC	—				x
CADMIUM	7.38				0.06
CHROMIUM	89.8				0.72
NICKEL	39.3				0.31
LEAD	68.4				0.55
SODIUM, %	0.94				75.2
CHLORIDES, % SOLUBLE	1.28				102.4
PH	8.0				8000
TOTAL SOLIDS, %	2.44				
VOLATILE SOLIDS, %	1.79			(HUMUS)	6000
PCB	<0.41				x <0.003

A VERY CLEAN SLUDGE!

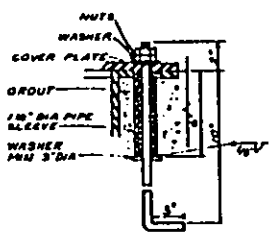
* A 4 DRY TON/ACRE LOADING EQUALS AN APPLICATION OF 38,600 GALLONS OF SLUDGE PER ACRE (AT 2.4% SOL
THIS IS ABOUT 7/8 ACRE-INCH OF LIQUID.



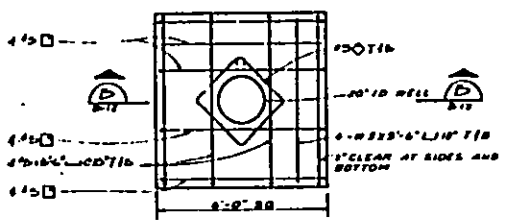
TYPICAL INJECTION WELL SECTION (A) B-12
NTS



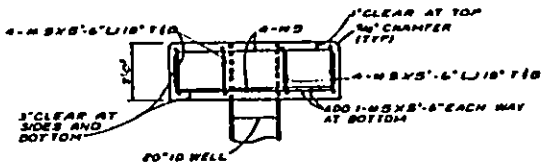
INJECTION WELL PLAN
1" = 1'-0"



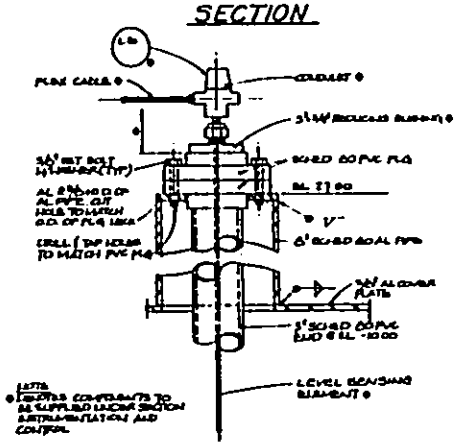
ANCHOR BOLT DETAIL (1) D-12
NTS



INJECTION WELL PAD REINFORCING PLAN
1" = 1'-0"



SECTION



DETAIL (2) D-12
NTS

CH2M HILL

LAHAINA WASTEWATER TREATMENT PLANT EXPANSION
AMFAC PROPERTY CORPORATION
MAUI, HAWAII

INJECTION WELLS NUMBERS 3 AND 4

B-13

PRELIMINARY

Section XV
SUMMARY OF UNRESOLVED ISSUES

There are no remaining unresolved issues.

Section XVI
REFERENCES

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- Flood Insurance Study, Maui County, Hawaii. U.S. Department of Housing and Urban Development, Federal Insurance Administration. Revised Preliminary. April 1980.

- Guidelines for Determining Flood Flow Frequency. Bulletin 17A. U.S. Water Resources Council. September 1981.

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- Open Channel Hydraulics. Ven Te Chow. 1959.

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APPENDIX A

WASTEWATER DEMAND ANALYSIS

Appendix A
WASTEWATER DEMAND ANALYSIS

A. POPULATION ANALYSIS

1. Base Population

West Maui had an adjusted 1980 population requiring sewerage service of 9,451 persons as shown by the U.S. Census Bureau's 8-22-1980 final field counts (all population figures are calculated from Census Bureau data unless otherwise noted).

10,284	>	West Maui total population
- 525	>	Kaanapali population: subtracted since resort wastewater demand is tallied separately.
- 308	>	Honokahua population: subtracted since area is not scheduled for sewerage service.
9,451	>	Persons

The adjusted West Maui population of 9,451 persons is further separated into two main communities: Lahaina town and Napili-Honokowai. Lahaina town had an adjusted 1980 population requiring sewerage service of 6,551 persons.

6,105	>	Lahaina town population
+ 446	>	Half of "unlocated" West Maui population counted by Census Bureau
6,551	>	Persons, equivalent to 69 percent of total adjusted West Maui population

Napili-Honokowai had an adjusted 1980 population requiring sewerage service of 2,900 persons.

2,454	>	Napili-Honokowai population
+ 446	>	Other half of "unlocated" West Maui population
2,900	>	Persons, equivalent to 30.7 percent of total adjusted West Maui population

2. Projected Population

Population forecasts for West Maui prepared by Hastings, Martin, Chew and Associates in April 1981, were subsequently incorporated into the proposed Lahaina Community Plan. Lahaina District's population is projected to increase from 10,284 persons in 1980 to 17,400 persons in 1990, or approximately 200 additional persons annually.

B. WASTEWATER DEMAND ANALYSIS

1. Current Wastewater Flows

Lahaina District's 1981 average municipal wastewater flows totaled 0.9 mgd according to the Department of Public Works,

Wastewater Division staff. This flow was entirely from the Lahaina town area. Of this total flow, 0.655 mgd was generated by 2,004 residential hookups, and 0.245 mgd from 137 commercial/tourist facility hookups.

The Kaanapali Beach Resort's 1981 average wastewater flows totalled 1.8 mgd.

2. Projected Wastewater Demand

a) Lahaina Town

Lahaina town's adjusted population is projected to grow by 450 persons annually through 1990. At a wastewater generation rate of 100 gallons per day (gpd) per person, wastewater demand should increase by 45,000 gpd (or 0.045 mgd), annually through 1990.

There are still 500 residences (of a total 2,505 homes) requiring sewerage hookup in Lahaina town. If these residences are hooked up at a rate of 10 percent per year, 50 more homes will be hooked up annually. At a wastewater generation rate of 350 gpd/unit, remaining hookups will generate an additional 17,500 gpd per year (or 0.0175 mgd/year).

Commercial and tourism-oriented growth will continue in Lahaina town. If wastewater generation from this growth increases 2 percent annually through 1990 over the 1981 base flow of 0.245 mgd, commercial and tourism growth will generate an additional 5,000 gpd annually (or 0.005 mgd).

Together, population growth, conservative commercial and tourism growth, and continued hookup of existing unsewered residences will increase wastewater demand by 68,000 gpd (or 0.07 mgd) annually, at least through 1990.

To project all wastewater accurately through 1990, predicted wastewater from the Kelawea Mauka and Ohbayashi (Kaanapali Hillsides) residential projects currently under construction must be added to the typical annual increases described above. Kelawea Mauka will add 241 residential units (0.084 mgd) in late 1982 while Kaanapali Hillsides will incrementally add 24 units (0.008 mgd) in 1983 and 135 units (0.047 mgd) in 1984, for a total count of 159 units.

The cumulative wastewater totals for Lahaina town are:

1981	0.9 mgd
1982	1.05 mgd (.0844 Kelawea Mauka, .0175 hookups, .005 commercial, .045 population increase)

1983	1.13 mgd (.0175 hookups, .005 commercial, .045 population increase, .008 Phase I Kaanapali Hillsides)
1984	1.24 mgd (same three annual increases plus .047 Phase II Kaanapali Hillsides)
1985	1.31 mgd (same three annual increases)
1986	1.38 mgd (same three annual increases)
1987	1.45 mgd (same three annual increases)
1988	1.52 mgd (same three annual increases)
1989	1.58 mgd (same three annual increases)
1990	1.65 mgd (same three annual increases)

These cumulative totals do not include an allowance for infiltration or seepage by groundwater (and sea water when collection lines lie below sea level) into the existing wastewater collection lines. In the Kaanapali Beach Resort, for example, infiltration is thought to increase total wastewater flows by approximately 14 percent daily.

b) Napili-Honokowai

The Napili-Honokowai adjusted population is projected to grow by 200 persons annually through 1990. At a wastewater generation rate of 100 gpd per person, wastewater demand should increase by 20,000 gpd (or 0.02 mgd) annually through 1990.

There are currently about 4,630 condominium and hotel units in the Napili-Honokowai area (1981). These units currently generate approximately 1,389,000 gpd of wastewater (or 1.39 mgd) at a rate of 300 gallons per unit per day. Additional condominium projects are currently under construction. With their cumulative 300 units, they will increase total wastewater demand upon completion of construction in 1983 to about 1,478,000 gpd (or 1.48 mgd). Continued condominium construction should increase the Napili-Honokowai area's unit inventory by about 2 percent annually thereafter through 1990. This conservative rate of growth, equivalent to adding 100 units (and 0.03 mgd wastewater) annually through the end of this decade, is assumed since the amount of vacant apartment and hotel-zoned land in the Napili-Honokowai area will become increasingly limited.

By the time the collection line is hooked up in 1984, wastewater demand in Napili-Honokowai should be approximately 1.88 mgd (0.37 mgd from 3,700 residents in homes and 1.51 mgd

from 5,030 condominium/hotel units). This projected demand does not account for existing commercial facilities in the service area (their number is undetermined). Furthermore, it does not include infiltration since the collection lines and service laterals will be new and presumably not susceptible to groundwater seepage.

The Napili-Honokowai wastewater collection line is scheduled for connection to the County's Honokowai treatment facility in late 1984. It is unlikely, however, that all users in the service area will be hooked up to the 2.0-mgd capacity collection line by this time. Therefore, it is assumed that 1.0 mgd of Napili-Honokowai's flows will be collected for municipal treatment in late 1984 and the remainder in 1985.

The cumulative wastewater totals for Napili-Honokowai are:

1984	1.0 mgd (1984 demand is actually 1.88 mgd)
1985	1.93 mgd (1984 demand is fully accommodated plus 0.02 mgd from residential growth and 0.03 mgd condo growth)
1986	1.98 mgd (plus same two annual increases)
1987	2.03 mgd (plus same two annual increases)
1988	2.08 mgd (plus same two annual increases)
1989	2.13 mgd (plus same two annual increases)
1990	2.18 mgd (plus same two annual increases)

c) Kaanapali Beach Resort

The resort's 1982 average wastewater demand of approximately 1.8 mgd is generated by 4,735 hotel, condominium, and residential units; two commercial facilities; and infiltration. After the Kaanapali Alii condominium is completed in late 1982, wastewater demand will increase to between 1.95 and 2.0 mgd. It will remain at this level until the proposed facility expansion comes on-line in late 1984.

Commitments have not yet been made for further development once the Kaanapali Alii is completed; however, Amfac is considering hotel/condominium development on its North Beach lands and residential possible planned development of its lands mauka of Honoapiilani Highway. However, there will not be sufficient wastewater treatment capacity available to accommodate both the North Beach and residential developments, so the Amfac staff is projecting development through 1990 at an average annual increase of about 0.12 mgd. This will result in a demand of approximately 2.8 mgd by 1990.

III. DEMAND ANALYSIS SUMMARY

By the end of 1982, wastewater flows to the West Maui treatment facility will be approximately 3.0 mgd. About 63 percent (1.9 mgd) of this demand will be generated by the Kaanapali Beach Resort and the remainder from Lahaina town.

Wastewater demand will have jumped to approximately 5.4 mgd by the end of 1985, by which time the proposed facility expansion will have been operating for 9 to 12 months. Approximately 40 percent of this demand will come from the Kaanapali Beach Resort, 35 percent from Napili-Honokowai, and 25 percent from Lahaina town.

The 6.7-mgd treatment capacity of the County facility and its Amfac-built expansion will be attained between 1990 and 1991. In 1990, approximately 42 percent of the total wastewater flow will come from the Kaanapali Beach Resort, 33 percent from Napili-Honokowai, and 25 percent from Lahaina town. The total 6.7-mgd capacity may be reached as early as mid-1988 from short-term high peak flows that typically occur in West Maui during holiday seasons and special events.

Table A-1

PROJECTED ANNUAL WEST MAUI WASTEWATER FLOWS
(mgd)

End of	Kaanapali Average	Lahaina Town	Napili-Honokowai	Total Municipal	Total West Maui	Available Treatment Capacity
1981	1.8	0.9	-	0.9	2.7	3.2 (County treatment facility)
1982	1.9	1.1	-	1.1	3.0	3.2
1983	2.0	1.1	-	1.1	3.1	3.2
1984	2.0	1.2	1.0	2.2	4.2	3.2
1985	2.1	1.3	1.9	3.2	5.3	6.7 (+3.5 from facility expansion)
1986	2.3	1.4	2.0	3.4	5.7	6.7
1987	2.4	1.5	2.0	3.5	5.9	6.7
1988	2.6	1.5	2.1	3.6	6.2	6.7
1989	2.7	1.6	2.1	3.7	6.4	6.7
1990	2.8	1.7	2.2	3.8	6.6	6.7
Average Annual Increase	0.12	0.08	0.05	0.33	0.44	

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APPENDIX B

ALTERNATIVE TREATMENT PROCESSES

Appendix B
ALTERNATIVE TREATMENT PROCESSES

Four wastewater treatment alternatives, in addition to the "Carrousel" oxidation ditch, were examined: rotating biological contactors, a jet aeration oxidation ditch, conventional extended aeration, and deep tank extended aeration. Several unit processes and operations are identical for all alternatives, including preliminary treatment consisting of fine screening; influent pumping; flow measurement; effluent pumping, storage, and disposal; and digested or thickened sludge handling, hauling, and disposal. These processes and operations are not discussed further, since they are components common to all the alternatives and, therefore, do not have direct bearing on the evaluation of the processes.

A. ROTATING BIOLOGICAL CONTACTORS

Rotating Biological Contactors are a biological secondary treatment system using a series of circular, corrugated plastic plates (media on which the bacteria which treat the wastewater grow). The media aerate the influent by slowly rotating while partially submerged in a basin of wastewater. The media is mounted on a central steel shaft, placed in a concrete basin, and is driven either electrically or pneumatically. This system operates without return of incompletely digested sludge (bacteria) or effluent to the concrete basins.

Sludge removed in the secondary clarifiers is pumped to an aerobic digester, which produces digested sludge with minimal odor problems. The biological stability of this sludge is equal to that of the other alternatives. Supernatent liquid is removed from the digester and returned to the rotating biological contactor units. The digested sludge is hauled by tank truck to areas for land application.

B. JET AERATION OXIDATION DITCH

In the jet aeration oxidation ditch (or channel) process, influent is pumped from the oxidation ditch into the jet aerator nozzles and blended with air. The air, supplied by blowers, is sheared into minute bubbles and entrained in the influent. The mixture is jetted into the main ditch volume to provide oxygen, mixing, and circulation within the channels.

The waste sludge handling system for this alternative is identical to that of the "Carrousel" oxidation ditch process.

C. CONVENTIONAL EXTENDED AERATION

The conventional extended aeration activated sludge process provides biological treatment with a complete mix mode utilizing low-speed, platform-mounted surface aerators. The other components are identical to those in the "Carrousel" oxidation ditch process.

D. DEEP TANK EXTENDED AERATION

Extended aeration activated sludge treatment is provided in a deep circular tank. Depending on installation, potential advantages over conventional extended aeration include a smaller and less expensive aeration tank, which has lower land area requirements than the conventional process.

Aeration is provided by subsurface static aerators consisting of static mixers (tubes) placed in vertical positions above an air inlet. Small bubbles released from the inlet provide for intense mixing of the air and influent inside the mixer tube. The deep tank extended aeration process is operated in a complete mix mode.

The waste sludge handling system is identical to those previously described.

APPENDIX C

ARCHAEOLOGICAL CORRESPONDENCE

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CONSERVATION AND ENFORCEMENT
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

July 18, 1980

Ms. Julie R. Abramson, Planner
Brock and Associates
48 Market Street
Wailuku, Hawaii 96793

Dear Ms. Abramson:

Subject: Archaeological Sites, Honokowai, Maui
TMK 4-4-02:Portion 3

Our records do not indicate the presence of historical, cultural, architectural and/or archaeological resources on this property which are listed on the Hawaii Register and/or the National Register of Historic Places, or that have been determined eligible for inclusion on the National Register of Historic Places.

As yet, only two sites have been identified in the general vicinity of the subject parcel: #1207, the Honokowai petroglyphs; and #1208, Honokowai house site. These sites would not be affected by development in the subject parcel.

As coastal areas have a greater density of archaeological sites, our office normally recommends that development plans in coastal areas contain provisions for the identification of significant sites and mitigation of adverse impact to those sites. At the minimum, we recommend a brief field reconnaissance by a qualified archaeologist. We also ask that this office be notified when previously unknown sites and artifacts are discovered during construction. For more information, please call our office at 548-6408.

Sincerely yours,

Susumu Ono
Chairman of the Board and
State Historic Preservation
Officer